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Section 5

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

5. Riverbank and Floodplain Soil Investigations

5.1 General

Seasonal and annual high-flow events on the River cause periodic flooding of certain portions of the Rest of River area. During flooding events, PCBs and other water-borne chemical constituents may be transported onto and over the upper portions of the riverbanks and onto the floodplain and deposited in the soils. As this occurs, riverbank and floodplain soils may become contaminated with PCBs and other water-borne chemical constituents. Investigation of these areas is critical to developing a thorough understanding of the distribution and fate of PCBs and other constituents of the Rest of River area since floodplains of various widths border the approximately 50 miles of the Rest of River downstream of the Confluence to the Massachusetts/Connecticut border and beyond into Connecticut. A brief summary of the numerous studies conducted by GE and EPA is presented in Section 5.2, with additional details provided in Appendix A. In general, the primary objective of these investigations was to assess the nature and extent of PCBs and other constituents in the River's adjacent banks and floodplain soils. An important outcome of this evaluation is a more complete understanding of the spatial distribution of PCBs in adjacent soils and the factors influencing the observed spatial variations.

Section 5.3 summarizes the physical properties of floodplain and riverbank soils. Section 5.4 evaluates the nature and extent of PCBs in these soils, and Section 5.5 summarizes information for non-PCB constituents. Consistent with the requirements of the Reissued RCRA Permit, data obtained from areas that have been identified as Actual/Potential Lawns have been included in this evaluation.

5.2 Summary of Sampling and Analysis Activities

A number of studies have been conducted to characterize floodplain and riverbank soils adjacent to the Housatonic River. Each of the major studies is listed in Table 5-1, summarized briefly below, and discussed in greater detail in Appendix A.

5.2.1 1988 to 1998

In 1988 and 1989, on behalf of GE, BBL collected approximately 100 floodplain soil samples on the DeVos property located immediately south of New Lenox Road along the eastern bank of the River. Broader sampling of the floodplain on behalf of GE occurred from 1990-1992 as part of the MCP Phase II Investigation. Sampling was conducted along 11 transects located from Coltsville to the Connecticut border, with 10 of the transects located downstream of the Confluence. Samples were collected along each transect in 6-inch depth increments, with more than 250 samples collected and analyzed for PCBs and percent solids.

Several additional floodplain soil sampling events were conducted between 1992 and 1994 by BBL on behalf of GE as part of MDEP-required activities to evaluate the need for STMs at specific properties within the floodplain. Floodplain soils in certain wildlife habitat and other areas between New Lenox Road and Woods Pond were also sampled. In 1994 and 1995, additional transect and some backwater sampling was conducted by BBL from the 10 existing transect locations between the Confluence and the Connecticut border, as well as from 12 additional transects. New transects were placed upstream of four existing dams located downstream of the Woods Pond Dam and at three other locations -- Stockbridge Golf Course, Searles Middle School, and the Sheffield Plain. Samples were collected in 6-inch depth increments and were analyzed for PCBs, percent solids, and TOC. More than 400 samples were collected during the 1994 and 1995 sampling events.

Sampling of two floodplain residential properties within the Rest of River area was also conducted in 1995 by BBL on behalf of GE. This investigation was expanded in 1997 and 1998, resulting in the collection of 360 additional samples from six other properties located between the Confluence and the Connecticut border.

5.2.2 1998 to Present

The most recent and extensive sampling of the Rest of River floodplain and riverbank soils was conducted by EPA as part of its SI. The sampling approach included the collection of samples from historical locations as well as additional locations and was generally conducted out to the 10-year floodplain. Thousands of systematic samples (collected at regularly spaced intervals) and discrete

samples (focused on specific areas) were collected to address specific data quality objectives (Weston, 2000). Samples were generally collected in 6-inch depth increments between 0 and 30 inches, although a majority of the samples were from the top foot of soil. Samples deeper than 30 inches were also collected at some locations. Samples were analyzed for multiple parameters including PCBs, physical characteristics such as percent solids, grain size and TOC, and Appendix IX constituents. EPA also collected soil data from vernal pools, which are poorly drained depressions in the floodplain that may become dry in summer. Most of these vernal pool samples (approximately 90%) were collected from the top 6 inches of soil and all were collected in Reaches 5 and 6. Because their hydrologic conditions may differ from surrounding areas, the vernal pool soil data are discussed separately from the floodplain and riverbank soil data. Finally, EPA conducted a meander survey and a toe pin study to assess bank erosion, which are discussed in Section 8.

5.2.3 Summary

In total, 6,317 floodplain, riverbank, and vernal pool soil samples have been collected to date by GE and EPA from more than 3,000 locations and analyzed for various chemical constituents. Of the 6,317 samples, 5,609 samples were defined as floodplain samples, 267 samples were defined as riverbank samples, and 441 were collected from vernal pools. Table 5-2 (below) summarizes the number of samples collected by sampling protocol (i.e., systematic or discrete) and subreach. Most of the samples (approximately 78%) contained in the database have been collected by EPA as part of its SI since 1998, and the majority of all samples collected are from locations within Reaches 5 and 7. Riverbank soil samples were collected when distinct riverbanks were encountered during the floodplain sampling activities or for subsequent use in the risk assessments.

Table 5-2. Floodplain and Riverbank Soils
Number of Discrete and Systematic Samples Collected – 1988-2002

Sampling Description	Reach 5A	Reach 5B	Reach 5C	Reach 6	Reach 7	Reach 8	Reach 9	Total
Floodplain								
EPA Discrete	852	222	374	103	742	26	194	**2513**
EPA Systematic	344	209	589	46	618	0	0	**1806**
GE Discrete	219	128	6	16	189	24	0	**582**
GE Systematic	194	92	125	160	22	0	115	**708**
Floodplain Total	**1609**	**651**	**1094**	**325**	**1571**	**50**	**309**	**5609**
Riverbank								
EPA Discrete	147	53	17	2	4	14	0	**237**
EPA Systematic	18	0	12	0	0	0	0	**30**
Riverbank Total	**165**	**53**	**29**	**2**	**4**	**14**	**0**	**267**
Vernal Pool								
EPA Discrete	218	122	63	7	0	0	0	**410**
EPA Systematic	10	12	9	0	0	0	0	**31**
Vernal Pool Total	**228**	**134**	**72**	**7**	**0**	**0**	**0**	**441**

Notes:
1. All GE and EPA data from all depths are included.
2. Samples numbers do not include QC samples.

All soil PCB data and other relevant physical parameters are presented in tables in Appendix B, while figures in Appendix B that were developed by EPA show soil sample locations and associated PCB results. Summary statistics on all detected non-PCB constituents in floodplain, riverbank, and vernal pool soil samples are included in tables in Appendix C.

All soil data collected from the Rest of River area floodplain, riverbanks, and vernal pools are discussed and used to evaluate spatial trends and other relationships in this section of the RFI Report. This entire dataset is used for trend assessment because: 1) the dataset is relatively recent (soil data were mostly collected from 1990 and later); 2) floodplain soil is not as dynamic a medium as surface water or sediment and is not expected to change as much over time; and 3) the size of the floodplain area warrants the use of the broadest coverage of data available. As noted above, however, due to the different hydrologic characteristics of vernal pools, the vernal pool data are evaluated separately from the floodplain and riverbank soil data (see Section 5.6)

5.3 Physical Characteristics of Floodplain and Riverbank Soils

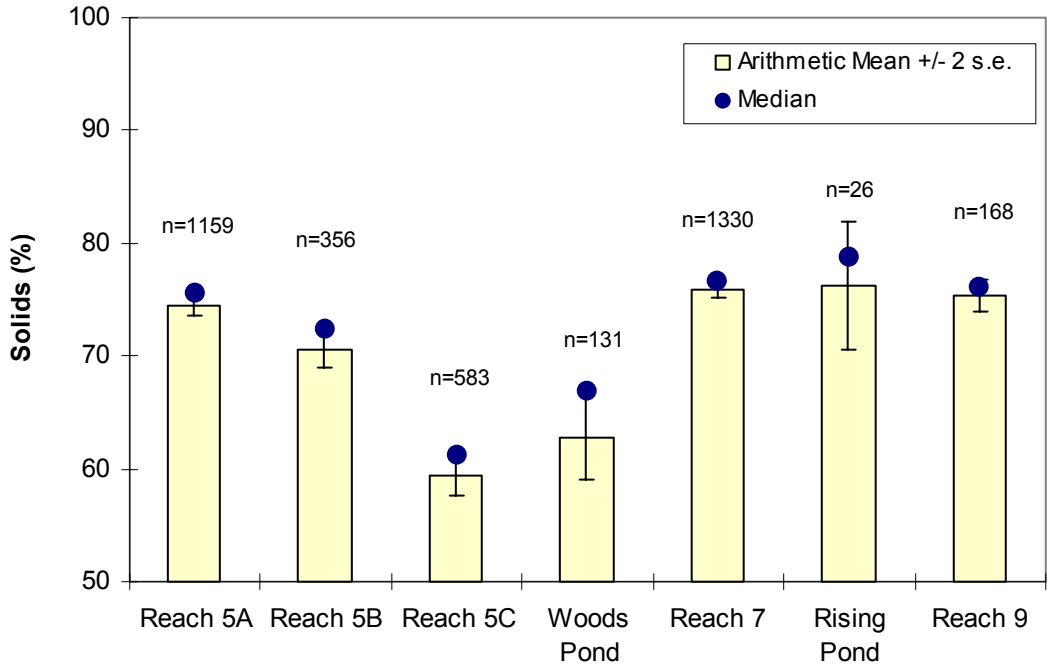
Certain physical properties of the floodplain and riverbank soils, including solids content, TOC, and grain size distribution, were determined through sample collection and analysis. These soil characteristics reflect conditions in the floodplain that either affect or may be associated with contaminant distribution. These parameters are often related to each other and may indicate differences in hydrologic conditions among floodplain areas (e.g., flooding frequency and duration, areas more prone to sediment deposition, etc.). For example, areas that are primarily depositional during periods of flooding would be more likely to contain finer particles potentially carried there from upstream sources. In areas where PCBs have been detected, these soil characteristics may be correlated with and may serve as an indicator of PCB concentrations. Spatial variations may indicate differences in hydrology and other mechanisms of transport that could account for differences in PCB content.

Results of analysis of data on the physical characteristics of the Rest of River floodplain and riverbank soils are summarized by reach (including number of samples, ranges, arithmetic means and medians) in Tables 5-3 through 5-5 and are discussed below. The data from individual samples are included in Appendix B.

5.3.1 Percent Solids

A total of 3,753 floodplain and riverbank soil samples collected between the Confluence and the Connecticut border were analyzed for percent solids. The majority of the percent solids data were for samples collected from Reaches 5 and 7, with floodplain soils comprising greater than 90% of all samples collected. A summary of the percent solids data is presented by reach in Table 5-3 and depicted on Figure 5-1 (below).

Figure 5-1. Floodplain and Riverbank Soils - Percent Solids by Reach



Note:
Includes all floodplain and riverbank soil data collected by EPA and GE.
n = number of samples.

In summary, the percent solids reported for the floodplain and riverbank soil samples show a huge range, from less than 1% to 100%, with an overall average of 72%. As shown in Table 5-3, the average percent solids are lowest in Reaches 5C and 6, generally around 60%, compared with average percent solids of 71% to 76% reported for the other River reaches. The median percent solids are generally similar to the reach averages and in some cases slightly higher than the averages, which is likely the result of a few low percent solids samples in those reaches. In Reach 5, where all but six of the riverbank samples were collected and analyzed, the average percent solids reported for the riverbank and floodplain soil samples by subreach are similar to one another; as shown in Table 5-3, the averages for both floodplain and riverbank samples fall between 70% and 75% in Reaches 5A and 5B, and are 59% in Reach 5C.

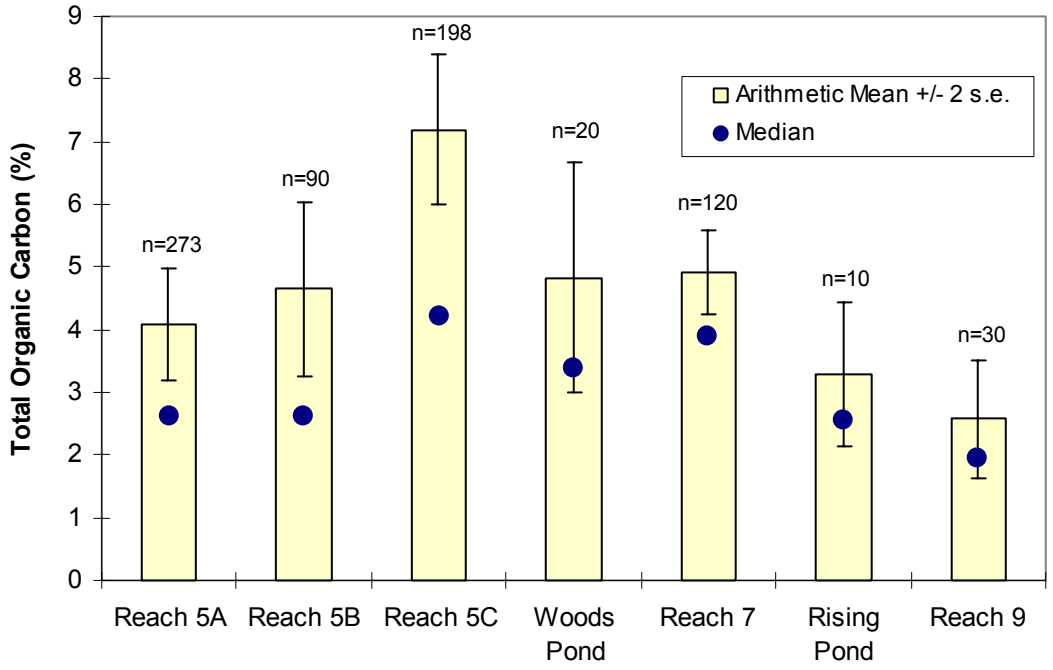
5.3.2 Total Organic Carbon

A total of 741 floodplain and riverbank soil samples collected between the Confluence and the Connecticut border were analyzed for TOC. A summary of the TOC data is presented by reach in Table

5-4 and on Figure 5-2 (below). As with percent solids, the majority of the TOC data were for samples collected from Reaches 5 and 7, with floodplain soils comprising greater than 90% of all samples collected.

In summary, TOC results reported for the floodplain and riverbank soil samples ranged from non-detect to 90%. Several high TOC values were observed, indicative of a lognormal distribution of the data. As shown in Table 5-4 and on Figure 5-2, the soil TOC data show a pattern of increasing arithmetic mean concentrations from Reach 5A, where the average value is 4.1%, to Reach 5C, where the average is 7.2%. Average TOC levels in the soils of Reaches 6 and 7 are lower at 4.8% and 4.9%, respectively, and decrease again in Reaches 8 and 9, where average values are 3.3% and 2.6%, respectively. Median values show a similar spatial trend, although the actual values are somewhat lower, suggesting that a limited number of elevated TOC values have raised the arithmetic means above the central tendency values.

Figure 5-2. Floodplain and Riverbank Soils - TOC by Reach



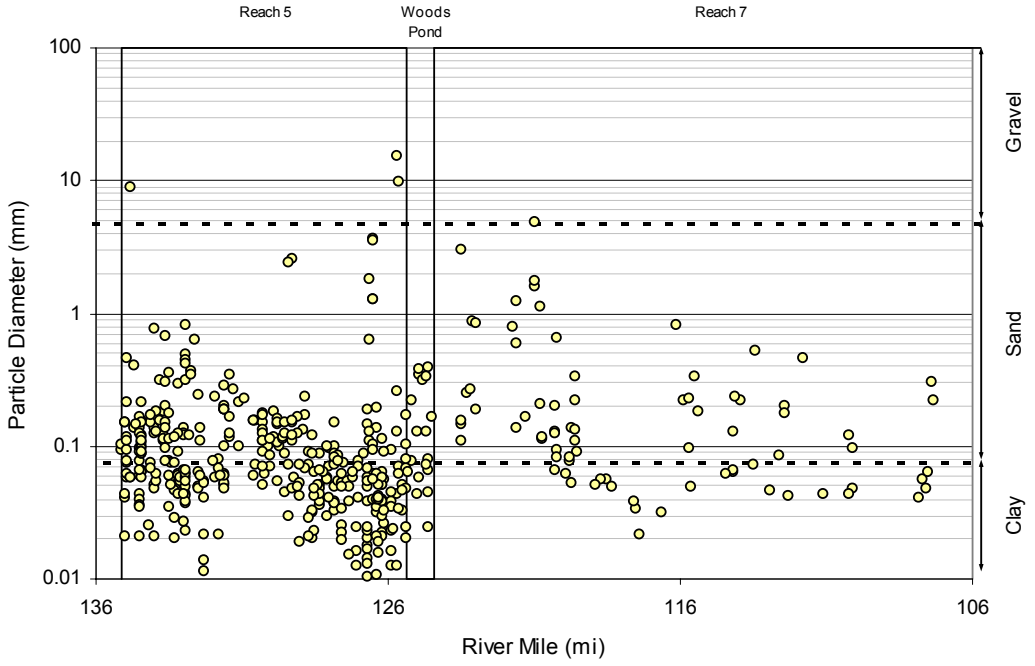
Note:
Includes all floodplain and riverbank soil data collected by EPA and GE.
n = number of samples.

In Reach 5, where all riverbank soil samples were collected and analyzed, average and median TOC concentrations in riverbank samples are lower overall than in floodplain samples (Table 5-4), particularly in Reach 5C, where the average TOC is 7.3% in the floodplain and only 3.3% in the riverbank soils.

5.3.3 Grain Size Distribution

A total of 482 floodplain and riverbank soil samples collected between the Confluence and the Connecticut border were analyzed for grain size. A summary of the grain size data is presented by reach in Table 5-5. The majority of samples collected for grain size analysis were from Reach 5, with floodplain soils comprising approximately 85% of all samples collected. Since few grain size soil data are available from Reaches 8 and 9, trends are discussed only for Reaches 5A, 5B, 5C, 6, and 7 (the Confluence to just above Rising Pond). Data show generally similar grain size distributions in floodplain soils among the reaches, with sand and silt representing the largest grain size fractions (Table 5-5). However, data also indicate a somewhat different grain size distribution in Reach 5C compared to Reaches 5A, 5B, 6, and 7. For example, the arithmetic mean percent sand values for Reaches 5A, 5B, 6, and 7 range from 42% to 49% while the average for Reach 5C is considerably lower at 31%. Conversely, silt and clay comprise the largest fraction of soils in Reach 5C, with an average of 65%, compared to 41.5% to 53% in all the other reaches. This pattern is illustrated on Figure 5-3 (below), which depicts the D-50 of floodplain and riverbank soils with distance downstream of the Confluence, and shows a decreasing D-50 within Reach 5. These data are consistent with the percent solids and TOC data, and collectively demonstrate that the floodplain in Reach 5C is more depositional than in other reaches, resulting in the finer grained soil.

Figure 5-3. Floodplain and Riverbank Soils – Median Grain Size (D-50) by River Mile



Note:
Includes all GE and EPA floodplain and riverbank data with an associated river mile.
Figure does not show 4 results collected on May 13 and 14, 1999 in Reach 9 (results all < 0.07 mm)

Comparison of floodplain and riverbank grain size distribution data presented in Table 5-5 shows that riverbank soils generally contained more sand and less silt and clay particles in all three reaches than did floodplain soils. Percent sand values in floodplain soil in Reaches 5A and 5B have arithmetic means of 45% and 44%, respectively, compared to 59% to 63% in riverbank samples in these reaches. In Reach 5C, where percent sand values are generally lower than in Reaches 5A and 5B, the increase is from 31% sand in the floodplains to 41% in the riverbanks. Correspondingly, silt and clay fractions in riverbank samples are lower than in floodplain samples, although the difference is smallest in Reach 5C.

Results overall indicate that the riverbank samples are sandier and contain less organic carbon than adjacent floodplain soils. These results are expected, since riverbanks are exposed to flowing water and floodplains are primarily depositional environments.

5.3.4 Summary

In summary, there are some differences in floodplain and riverbank soil physical properties, indicating the presence of spatial trends by River reach. Floodplain and riverbank soil percent solids within Reach 5 are lowest in Reach 5C, and Reach 5C floodplain samples have the highest organic carbon content and the highest proportion of silts and clays on average. The floodplain soil results generally indicate the presence of wetter, finer-grained soils in Reach 5C, which is indicative of the flatter, broader floodplain in this reach. The floodplain soils below Reach 6 tend to be drier and sandier, similar to Reach 5A. In Reach 5, riverbank soils tend to contain more sand and less organic carbon than the adjacent floodplain soils.

5.4 Nature and Extent of PCBs in Floodplain and Riverbank Soils

This section presents the data and findings of the floodplain and riverbank soil investigations, including the nature and extent of PCBs detected in the floodplain and riverbank soils in the Rest of River.

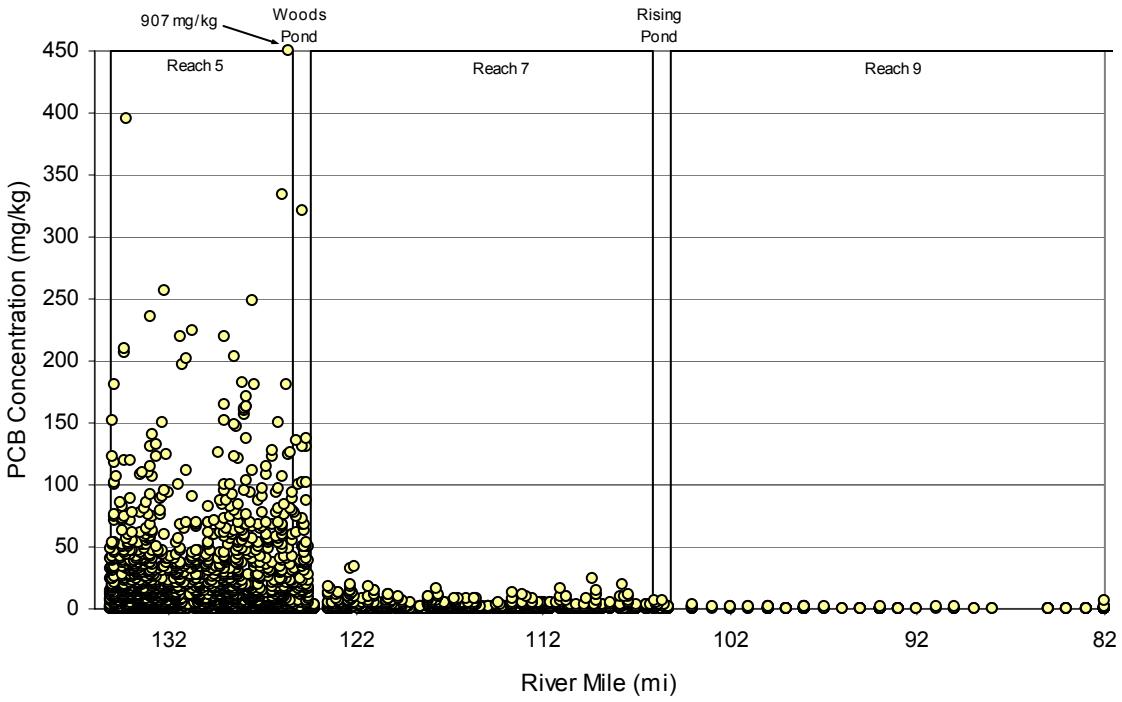
5.4.1 Overview

Of the 6,317 samples collected, a total of 5,800 floodplain and riverbank samples have been analyzed for PCBs. Nearly 96% of these are floodplain samples; only 4% (237) are riverbank samples. Statistical summaries of the total PCB results by subreach are presented in Table 5-6 and by reach and sampling depth in Table 5-7. The individual PCB results are presented along with select corresponding physical data in Appendix B.

Figure 5-4 (below) shows all soil PCB data (floodplain and riverbank combined, all sample depths) as a function of distance from the Confluence. Overall, PCB concentrations decline with increasing distance downstream of the Confluence. The highest PCB concentrations occur in Reach 5 (maximum value of 907 mg/kg in Reach 5C in a sample from 2 feet to 2.5 feet below ground surface [bgs]). A sharp decrease in floodplain soil PCB concentration occurs downstream of Woods Pond, where the maximum single-sample value was 38 mg/kg in Reach 7 (in a sample from 3 feet to 3.5 feet bgs) and median values in Reaches 7, 8, and 9 at all sample depths are generally 1 mg/kg or less. In conjunction with information

presented in Sections 2 through 4 of this RFI Report, this observation suggests that Woods Pond as well as floodplain areas in Reach 5 play a significant role in reducing the transport of PCBs downstream of Reach 6.

Figure 5-4. Total PCB Concentration by River Mile



Note:
Includes all GE and EPA floodplain and riverbank data with an associated river mile.

Figure 5-4 also shows the high variability in PCB concentrations measured in floodplain and riverbank soils in the Rest of River area. One of the objectives of the floodplain and riverbank investigation was to evaluate other factors that affect the PCB concentrations observed in the floodplain. In the following subsections, PCB concentrations are discussed in relation to:

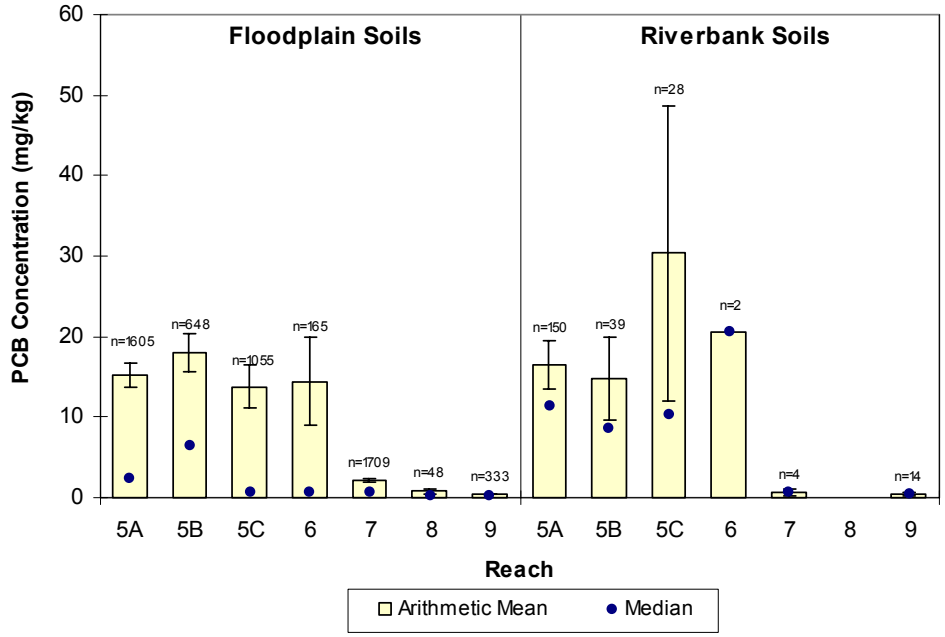
- Floodplain or riverbank sample location and River reach;
- Sample depth internal;
- Lateral distance from the edge of water;
- Frequency of inundation due to flooding; and
- Physical characteristics of soils.

5.4.2 PCB Concentration by Reach

5.4.2.1 Floodplain Soil

The floodplain soil datasets by reach were evaluated to identify general spatial trends. As shown in Table 5-6, there is a large range in the number of samples collected from Reaches 5 through 9, with the total number of floodplain PCB samples in all reaches ranging from 48 in Reach 8 to 1,709 in Reach 7. Nonetheless, general comparisons among reaches can be made. Arithmetic mean and median PCB concentrations are presented by reach on Figure 5-5 (below). As shown on that figure, the arithmetic means of PCB concentrations in floodplain soil are lowest in Reaches 8 and 9 (less than 1 mg/kg) and the mean concentration in Reach 7 is just over 2 mg/kg, compared to arithmetic means between 14 mg/kg and 18 mg/kg in Reaches 5 and 6. Aside from showing generally higher arithmetic mean PCB concentrations in Reaches 5A, 5B, 5C, and 6, Table 5-6 and Figure 5-5 also show that median PCB concentrations are much lower than the arithmetic means in these reaches, with values ranging from 0.55 mg/kg to 6.8 mg/kg. These lower median values reflect the fact that the distribution of the floodplain soil PCB data within each reach is closer to log-normal than normal due to the presence of a relatively small number of samples with uncommonly high PCB concentrations (maximum PCB concentrations in each reach are presented in Table 5-6), which raises the arithmetic mean above the central tendency value.

Figure 5-5. Floodplain and Riverbank Soils - Arithmetic Mean and Median PCB by Reach



Note:
Presents arithmetic mean and 2 standard error for all EPA and GE floodplain and riverbank soil PCB data.
n = number of samples.

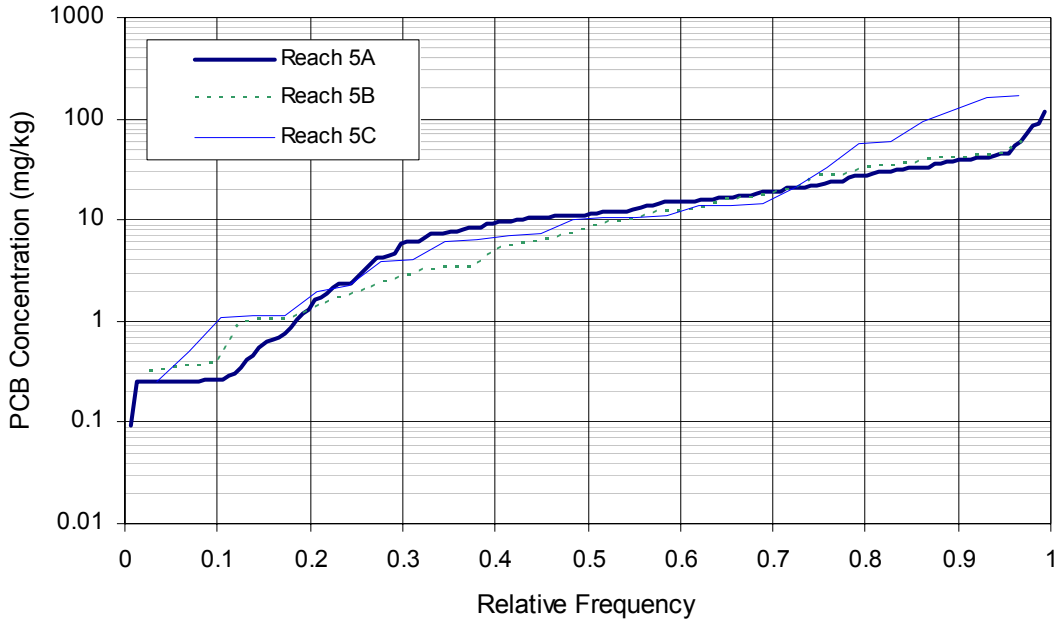
5.4.2.2 Riverbank Soil

Riverbanks within a given reach may be expected to contain higher PCB concentrations than floodplain soils in the same reach due to their more frequent contact with surface water PCBs. As erosion of riverbanks also may be an important source of PCBs to the River, this section examines data for riverbank samples separately and compares the results to those obtained for floodplain samples.

The majority (150 of 237, or 63%) of riverbank samples were collected in Reach 5A, with 67 samples collected from Reaches 5B and 5C and a total of 20 samples collected from Reaches 6, 7, and 9 (Table 5-6). In Reaches 7 and 9, the maximum observed PCB concentration in riverbank samples was 1.2 mg/kg. Within Reaches 5A, 5B, and 5C, where the majority of the riverbank samples were collected, most riverbank samples were collected from the 0- to 0.5-foot and 0.5- to 1-foot soil layers (Table 5-7). For these reaches, riverbank soil PCB concentrations ranged from non-detect to 171 mg/kg (reported at a depth of 0.5 to 1 foot in Reach 5C) (Table 5-7). As observed for the floodplain soils, the median riverbank soil PCB concentrations are substantially lower than the means, due to a limited number of high concentrations.

Arithmetic mean and median PCB concentrations in riverbank samples are shown for all reaches on Figure 5-5 (above). In Reaches 5A and 5B, arithmetic means are similar to each other at 16 mg/kg and 15 mg/kg, respectively. The average riverbank value in Reach 5C is higher, at 30 mg/kg, in part reflecting an increase in the mean caused by the highest observed PCB concentration of the three subreaches. Median PCB concentrations for the three subreaches are lower and less variable, ranging from 8.6 mg/kg to 11 mg/kg, indicating that the central tendency of the PCB data is similar throughout Reach 5. Frequency distributions of PCB results from all riverbank samples collected from Reaches 5A, 5B, and 5C are shown on Figure 5-6 (below). These figures indicate that overall, the PCB concentrations of riverbank soils are generally similar in all three subreaches and follow similar distributions.

Figure 5-6. Frequency Distribution of PCBs in Reach 5 Riverbank Soils



Note:
Includes all GE and EPA riverbank soil data.

5.4.2.3 Comparison of Floodplain and Riverbank PCB Concentrations

Figure 5-5 (above) shows that in Reaches 5A and 5B, arithmetic mean PCB concentrations in riverbank and floodplain samples are similar, but the arithmetic mean in Reach 5C is considerably higher in riverbank than in floodplain samples. Median values are higher in riverbank than floodplain soils in all three subreaches, especially in Reaches 5A and 5C. In Reach 5C, this appears to be influenced in part by a large number of floodplain samples with less than 1 mg/kg PCB collected in the distal portions of the 10-year floodplain. The presence of higher concentrations of PCBs in riverbank soils than in floodplain soils reflects the riverbanks' greater proximity to the River and their consequent increased frequency of surface water contact. This lateral trend is discussed later in this section.

5.4.3 PCB Depth Distribution in Floodplain and Riverbank Samples

Spatial trends in PCB concentration with depth were evaluated by compiling the floodplain/riverbank soil results into 6-inch depth increments. Summaries of the floodplain and riverbank total PCB results by subreach and sampling depth are provided in Table 5-7, and arithmetic and median values are plotted on Figures 5-7a through 5-7c for data from 6-inch depth intervals of the floodplain and riverbank samples (combined). The number of samples collected and analyzed within each depth interval is highly variable; most samples were collected in 6-inch depth intervals from within the top 2.5 feet of floodplain soil, but at a few locations PCBs were detected at depths of several feet.

In general, Figures 5-7a through 5-7c show that floodplain soil arithmetic means in Reaches 5A, 5B, 5C, and 6 exhibit considerable within-reach variability among depth intervals. Those means are also generally higher than the medians, indicating the influence of a limited number of high concentrations. In addition, the standard error bars on arithmetic means tend to be much larger for the deeper layers in Reach 5, again indicating the occurrence of a relatively small number of samples with high PCB concentrations at those depths. PCBs were detected in a majority of the depth intervals collected from all reaches, with the maximum concentrations generally occurring in the top 30 inches (see Table 5-7).

Riverbank soil samples were collected from Reaches 5, 6, 7, and 9 at depths of up to 2.5 feet; however, most samples were collected from the upper two 6-inch intervals (i.e., the top foot) in Reach 5A. Although the dataset for deeper soil intervals is relatively limited, the data indicate that PCBs were detected in nearly all depth intervals collected from all reaches, with the maximum PCB concentrations occurring within the top foot (Table 5-7).

A more detailed discussion of PCB results by reach and depth interval for 6-inch depth interval data summarized in Table 5-7 is presented below.

5.4.3.1 Reach 5

A total of 3,249 floodplain soil samples were collected from Reach 5 at depths of up to 9.5 feet and analyzed for PCBs. PCB concentrations reported for samples collected in this reach ranged from non-detect to 907 mg/kg (which was measured in the 2- to 2.5-foot interval in Reach 5C). Arithmetic mean

PCB concentrations are generally similar among the most sampled depth intervals, except in Reach 5C where the mean increases with depth to the 2.5- to 3-foot interval. Median values are generally much lower than the means, indicating the presence of a few high concentrations elevating the arithmetic means.

A total of 204 riverbank samples were collected from Reach 5 at depths of up to 2.5 feet for PCB analysis, with more than 60% of the samples being collected from the upper 1-foot depth interval within Reach 5A. The maximum single-sample PCB concentrations for each subreach were found in the 6- to 12-inch depth increment, but the average and median concentrations are variable among depths. The average PCB concentrations in the top foot (0- to 6-inch and 6- to 12-inch depths) are higher in Reach 5C than in Reaches 5A and 5B. However, the median values are fairly consistent among reaches.

5.4.3.2 Reach 6

In Reach 6, a total of 162 floodplain soil samples were collected and analyzed for PCBs to a depth of up to 2.5 feet. PCB concentrations reported for samples collected from this reach ranged from non-detect to 321 mg/kg (which was measured in the 0- to 0.5-foot interval). Arithmetic mean PCB concentrations in Reach 6 floodplain soil depth interval samples decrease with depth from a high of 19 mg/kg in the 0- to 0.5-foot interval to 1.4 mg/kg in the 2- to 2.5-foot interval. This pattern is also generally reflected in median PCB concentrations.

Two riverbank soil samples were collected in Reach 6: one from the 0- to 0.5-foot interval with a PCB detection of 24 mg/kg, and the second from the 0.5- to 1-foot interval with a PCB detection of 17 mg/kg.

5.4.3.3 Reaches 7 through 9

A total of 2,090 floodplain soil samples were collected from Reaches 7, 8, and 9, with the majority of samples collected in the top 2.5 feet within Reach 7. PCB concentrations in Reach 7 floodplain soils are much lower than in Reaches 5 and 6, and no depth-related PCB concentration trends are observed. In Reaches 8 and 9, most data were from the top two 6-inch intervals only and PCB concentrations were

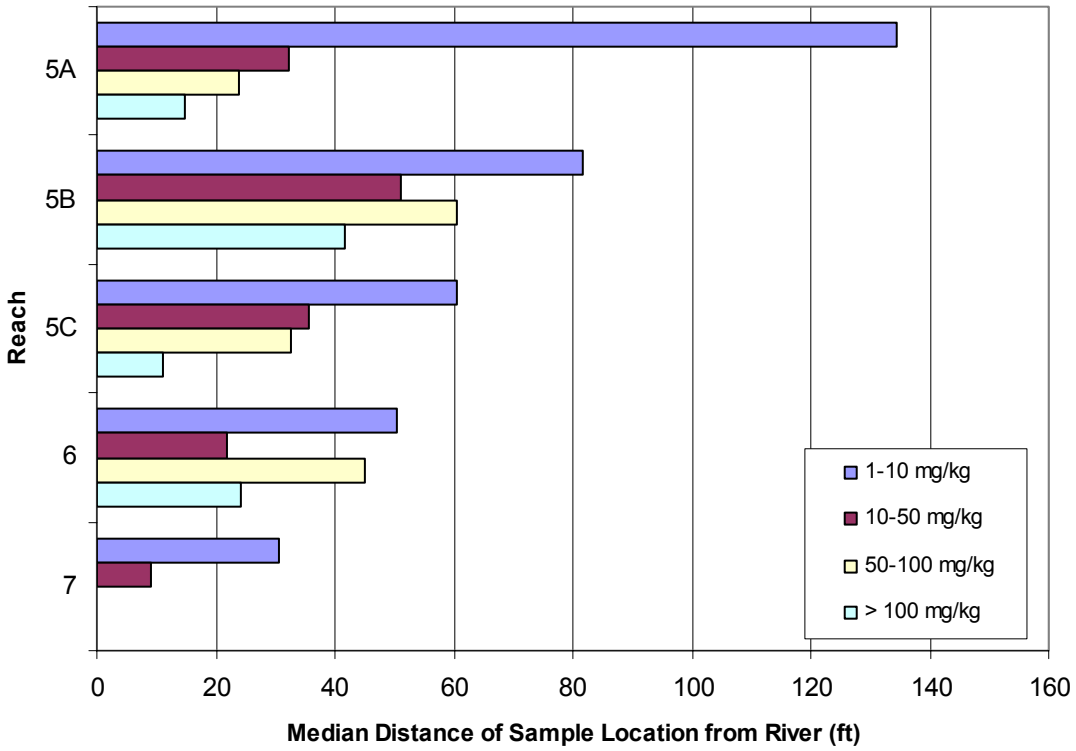
generally below 1 mg/kg. Median PCB concentrations in all these reaches are consistently lower than the arithmetic means, indicating that a few reported high concentrations are elevating the mean values.

Eighteen riverbank soil samples were collected in Reaches 7 and 9 for PCB analysis, with nearly all samples being collected within the top foot. Due to the small number of samples collected within each reach, no discernible spatial relationship can be seen. However, reported PCB concentrations were generally less than 1 mg/kg.

5.4.4 Lateral PCB Distribution from Edge of Water Outward

To expand on the observation that riverbank samples have higher PCB concentrations on average than floodplain samples, the effect of increasing distance from the riverbank into the floodplain was evaluated and quantified. ArcView GIS was used to calculate the distance of each sample (surface [0 to 6 inches] and subsurface) from the nearest riverbank point (for purposes of this analysis, "riverbank" was defined by the edge of water determined from the GIS coverage for the site). The summary statistics of the distance to edge of the water for samples within various PCB concentration ranges (1-10 mg/kg, 10-50 mg/kg, 50-100 mg/kg, and > 100 mg/kg) were then calculated. The results of this analysis are presented on Figure 5-8 (below). Figure 5-8 shows that in Reach 5A, the median distance for all samples (including floodplain and riverbank samples combined) containing between 1 and 10 mg/kg is 135 feet, while samples containing 10 to 50 mg/kg tend to occur much closer to the riverbank, at a median distance of only 32 feet. Samples with PCB concentrations greater than 100 mg/kg were located even closer to the riverbank at a median distance of only 15 feet. A similar lateral trend is apparent for samples collected from Reaches 5B, 5C, and 6 (although it is less pronounced for Reaches 5B and 6).

Figure 5-8. PCB Concentration Range vs. Distance from River



Median Distance from River					
PCB Concentration Range (mg/kg)	Reach 5A (ft)	Reach 5B (ft)	Reach 5C (ft)	Reach 6 (ft)	Reach 7 (ft)
1-10	135 (436)	82 (170)	60 (207)	51 (19)	31 (620)
10-50	32 (475)	51 (218)	36 (173)	22 (36)	9.1 (78)
50-100	24 (99)	61 (58)	33 (68)	45 (7)	--
> 100	15 (40)	42 (12)	11 (30)	24 (6)	--
Maximum Distance from any sample (ft)	1,452	652	638	167	562

Notes:
Value in parentheses indicates the number of samples.

In Reach 7, where PCB concentrations in floodplain samples are much lower overall, samples were collected from up to 562 feet from the riverbank. The median distance for samples exhibiting PCB concentrations between 1 mg/kg and 10 mg/kg is 31 feet, compared to only 9.1 feet for samples with PCB concentrations between 10 mg/kg and 50 mg/kg (the maximum observed PCB concentration in this reach was 38 mg/kg). This indicates that the highest PCB concentrations observed in this reach are generally found within a few feet of the riverbank.

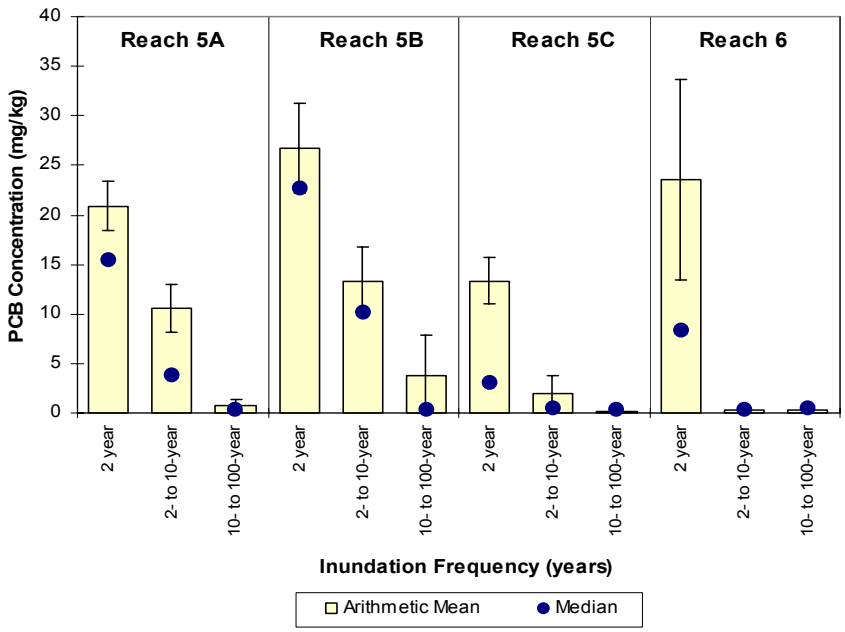
Overall, these evaluations show that the likelihood of encountering higher PCB concentrations decreases with increasing distance from the River. The farthest median distance for samples with higher PCB concentrations (i.e., greater than 10 mg/kg) occurs in Reach 5B, suggesting that the broadest lateral distribution of higher PCB concentrations exists in that reach.

5.4.5 Inundation Frequency

Flood frequency is an additional factor that may help explain the spatial distribution of PCBs in floodplain soils. The objective of this analysis was to account for changing topography within the floodplain area. To perform this analysis, soil PCB concentrations were related to estimates of the flood frequency at each sample location in Reaches 5 and 6. This analysis was limited to Reaches 5 and 6 due to higher PCB concentrations present in these reaches, their relatively small size (as compared to Reaches 7 and 9), and the complexity of the information needed for this analysis. In addition, the detailed photogrammetric topography necessary for the resolution of this analysis was available only for Reaches 5 and 6. Digital elevation data, sample geographic coordinates, and a HEC-2 hydraulic model were used to relate River flow data to estimated flood frequency at each sample location. All sample locations between the Confluence and Woods Pond Dam were assigned to one of three inundation frequency categories: 2-year, 2- to 10-year, and 10- to 100-year. The 2-year and 2- to 10-year floodplain isoplethes were generated using surface water profiles predicted by the HEC-2 model. The 10- to 100-year floodplain isopleth was established based on FEMA flood mapping. The estimated 2-year, 2- to 10-year, and 10- to 100-year floodplain areas are shown on Figure 5-9.

Next, the average and median total PCB concentrations in floodplain surface soil samples were calculated for samples in each flood-frequency category in Reaches 5A, 5B, 5C, and 6. Surface soils are examined, as opposed to soils at depth, since the observed PCB concentrations can be assumed to be indicative of more recent deposition during inundation. Results are plotted on Figure 5-10 (below). As depicted on Figure 5-10, data show that in all reaches examined, the highest PCB concentrations are found within the 2-year floodplain, with progressively lower concentrations occurring in the 2- to 10-year and 10- to 100-year floodplain categories. Only a few samples collected from outside the 2- to 10-year floodplain had detectable PCB levels.

Figure 5-10. Floodplain Surface Soils - PCB by Reach and Inundation Frequency



In Reach 5A, arithmetic mean surficial PCB concentrations decrease from 21 mg/kg in the 2-year floodplain to 11 mg/kg in the 2- to 10-year floodplain. Beyond the 10-year floodplain, the arithmetic means are less than 1 mg/kg. In Reach 5B, PCB concentrations decrease from 27 mg/kg in the 2-year floodplain category to approximately 13 mg/kg in the 2- to 10-year floodplain category and to 3.7 mg/kg or lower in less frequently inundated floodplain. The mean PCB concentration of 3.7 mg/kg in the surface of the 10- to 100-year floodplain in this reach is due to a few high PCB detections skewing the result, as evidenced by the low median value (0.25 mg/kg). In fact, over 50% of PCB concentrations in the surface soils in the Reach 5B 10- to 100-year floodplain were non-detect and over 80% of results were less than 1 mg/kg. In Reaches 5C and 6, average PCB concentrations in the surface quickly drop to levels at or below 1 mg/kg outside of the 2-year inundation frequency. Overall, these results are consistent with the evaluation of PCB concentrations as a function of distance from the riverbank, and support the conclusion that PCBs carried into the floodplain during flooding tend to deposit close to the riverbanks.

5.4.6 Comparison of Soil PCB Concentrations to Previously Defined 1 mg/kg PCB Isopleth

Prior investigations of the Rest of River area resulted in the development of an approximate 1 mg/kg PCB isopleth for the floodplain in Reaches 5 and 6, which generally corresponds to the 10-year floodplain. The development of this isopleth is discussed in the 1996 RFI Report (BBL, 1996). The previously defined 1 mg/kg PCB isopleth is depicted on Figure 5-11. Since that time, a considerable amount of additional soil PCB data has been generated from these reaches. Analysis of the current dataset shows that most samples with PCB concentrations greater than 1 mg/kg fall within the previously defined isopleth, thus confirming the findings of the 1996 RFI Report. Of the approximately 1,990 surficial soil samples collected in Reaches 5 and 6 for PCB analysis, only 42 samples (2%) had PCB detections above 1 mg/kg in areas outside the predicted 1 mg/kg isopleth. At these locations, PCB concentrations greater than 1 mg/kg were not detected in the subsurface samples. By contrast, more than 730 surface soil samples collected from the top one-foot interval within the 1 mg/kg isopleth showed PCB concentrations less than 1 mg/kg.

5.4.7 Correlation of PCB Concentrations to Soil Characteristics

Relationships between PCB concentrations and physical characteristics in reaches with more abundant data were also evaluated. Because PCBs have a stronger affinity for organic carbon and finer-grained soil or sediment particles such as silt and clay, positive correlations among PCB concentration, organic carbon content, and the fractions of silt and clay would be expected. Also, because higher solids content is usually associated with sandier soils containing less organic carbon, a negative relationship between PCB concentration and percent solids is commonly observed.

5.4.7.1 TOC

All floodplain and riverbank soil PCB and TOC data are plotted, by reach, on Figures 5-12a through 5-12c. As evidenced in these figures, PCB concentrations are positively correlated with TOC in floodplain soils in all reaches, with the possible exception of Reach 9, where there are little data and PCB

concentrations were all very low. The locations with the highest PCB concentrations in the floodplain also show elevated levels of TOC.

5.4.7.2 Percent Solids

All floodplain and riverbank PCB and percent solids data are shown by reach on Figures 5-13a through 5-13c. As observed on those figures, the relationship between PCB concentration and percent solids in floodplain soils varies by reach. The strongest relationships are observed in Reaches 5B, 6, and 8, where the lowest PCB concentrations generally occur in soils with the highest percent solids. However, there is no clear relationship between PCB concentrations and percent solids in Reaches 5A and 5C, where elevated PCB concentrations occur over the entire range of observed percent solids, although in both reaches, non-detections are less common in soils with very low percent solids. In Reaches 7 and 9, there is also no obvious relationship observable in the data; however, the PCB concentrations tend to be low (typically less than 10 mg/kg) and within a narrower range of concentrations compared to the reaches above Woods Pond Dam.

5.5 Analysis of PCB Aroclor and Homolog Composition

5.5.1 PCB Aroclors

Individual PCB Aroclors were quantified in a subset of the 6,059 total PCB samples (including quality control [QC] samples). A summary of the quantified PCB Aroclors by reach is presented in Table 5-8, below. The PCBs detected in Housatonic River floodplain and riverbank soils were predominantly quantified as Aroclor 1260, which was quantified at detectable levels in approximately 96% of the samples with detectable amounts of PCBs. The remainder of the PCB detections was quantified mostly as Aroclor 1254 (approximately 4% of samples). PCB Aroclors 1242 and 1248 were typically quantified in less than 0.1% of samples.

Table 5-8. Floodplain and Riverbank Soils - PCB Aroclor Composition Percent of Total PCBs

Reach	N	Average Quantitation at Each Location (%)			
		Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
Reach 5A	1819	0.0	< 0.1	5.7	94
Reach 5B	579	0.0	< 0.1	2.2	98
Reach 5C	1268	< 0.1	< 0.1	2.5	97
Reach 6	174	0.0	0.0	3.1	97
Reach 7	1805	0.1	0.2	4.6	95
Reach 8	51	0.0	0.0	0.7	99
Reach 9	363	0.0	0.0	3.6	96

Note:
Includes all EPA and GE riverbank and floodplain soil data (1988-2002) with detectable PCB.

5.5.2 PCB Homolog Composition

Individual PCB homolog groups were quantified in 135 floodplain and riverbank soil samples collected by EPA between 1999 and 2002 from Reaches 5, 6, 7, and 9 and analyzed for PCB congeners. The average homolog proportions of total PCB concentration for all these samples and individual reaches are summarized on Figure 5-14. Results show a relatively consistent homolog composition in all reaches. Hexachlorobiphenyls are consistently the most abundant homolog, followed by heptachlorobiphenyls. In Reaches 5 and 6, pentachlorobiphenyls are slightly more abundant than octachlorobiphenyls on average. In Reaches 7 and 9, octachlorobiphenyls slightly exceed pentachlorobiphenyls. Similar to the PCB Aroclor results discussed above, the average PCB homolog composition shows that the PCB mixture in floodplain and riverbank soils is most similar to Aroclor 1260.

5.6 Vernal Pool Results

Vernal pools are poorly drained depressions in the floodplain that may become dry in summer. Because their hydrologic conditions may differ from surrounding areas, soils collected from vernal pools may have physical characteristics and PCB concentrations that are significantly different from those observed in floodplain or riverbank samples. As a result, samples from these areas were not included in the analysis of floodplain and riverbank soil samples presented earlier.

A total of 433 samples collected from 411 locations within vernal pools in Reaches 5A, 5B, 5C, and 6 were analyzed for PCBs (queried as "VP" samples from the "Location Type" field in the November 2002 EPA database). These samples were most commonly collected from the surface sediment (over 90% within the upper 6 inches), although at four locations samples extended to a depth of 2.5 feet. No vernal pool samples were collected from Reaches 7, 8, or 9. Vernal pool sample locations are shown on Figure 5-15. Soil characteristics and PCB results are discussed below.

5.6.1 Percent Solids, Total Organic Carbon, and Grain Size Distribution

In Reaches 5A, 5B, and 5C, 316 vernal pool samples were analyzed for solids content; arithmetic mean percent solids values are 50%, 48%, and 49%, respectively (Table 5-9). These values are lower than values observed in the floodplain samples from the same subreaches, where arithmetic mean percent solids values range from 59% in Reach 5C to 74% in Reach 5A. Only two samples from Reach 6 were analyzed for percent solids; those results were 32% and 50%, which are both lower than the floodplain soil average of 63%.

In contrast to percent solids results, TOC concentrations in vernal pools are generally higher than levels observed in floodplain samples. A total of 358 vernal pool samples from Reach 5 were analyzed for TOC; arithmetic mean TOC in the Reach 5 vernal pool samples ranges from 12% in Reach 5A to 15% in Reach 5B (Table 5-10). These values compare with a range of only 4.1% to 7.2% in floodplain soils in Reach 5. The two samples from Reach 6 with TOC data were very high, at 24% and 35% TOC, compared to an average of only 4.8% for the floodplain and riverbank soils in Reach 6.

Vernal pool samples also contain a much higher proportion of silt and clay than surrounding floodplain soils, indicating that the vernal pool sampling successfully distinguished areas that are different from the typical floodplain. Grain size results for the 357 vernal pool samples analyzed for grain size in Reaches 5 and 6 are summarized in Table 5-11. Silt represented 57% to 76% of the vernal pool samples on average, compared to averages in the floodplain soils ranging from only 38% (Reach 6) to 51% (Reach 5C). Conversely, percent sand comprised a lower fraction of vernal pool samples than in the floodplain and riverbank soils, with a range in the arithmetic means from 1.7% to 25% in vernal pool samples, compared to 31% to 49% in the floodplain soils.

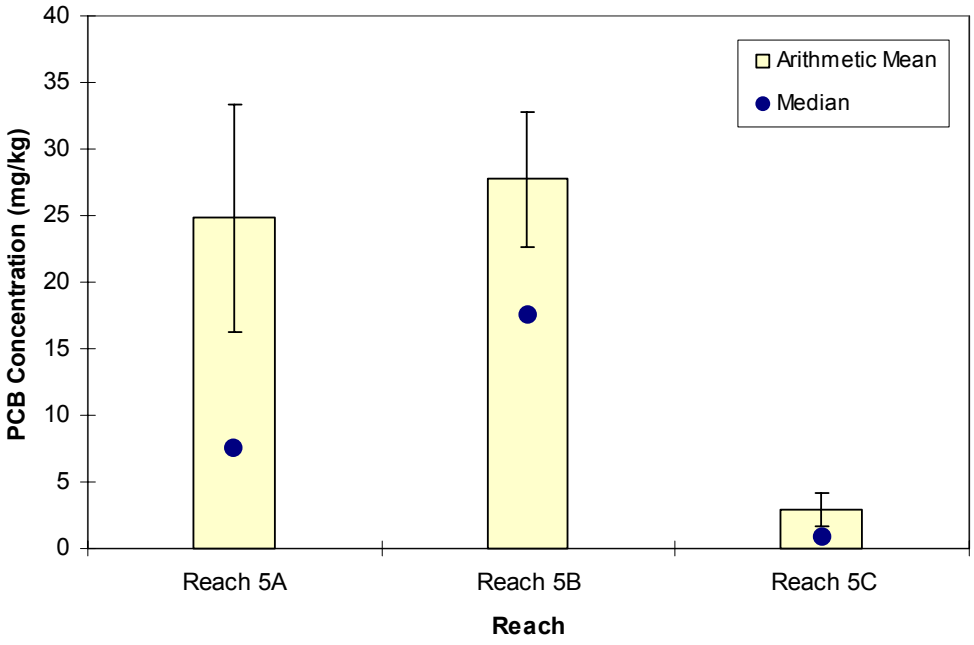
In summary, data on vernal pool soil characteristics from Reaches 5A, 5B, and 5C indicate that, as expected, wetter, finer-grained, more organic soils are present in vernal pools than generally occur in surrounding floodplain areas.

5.6.2 PCB Concentrations

Total PCB concentrations for all vernal pool samples analyzed for PCBs are presented by reach in Table 5-12. In addition, to facilitate the comparison of PCB concentrations by depth, vernal pool data were depth-weighted (as necessary) and summarized by 6-inch increments in Table 5-13. Table 5-13 shows that most (over 90%) of the data are from the 0- to 0.5-foot depth interval of vernal pool soil. Although data from a relatively small number of deeper samples indicate that PCBs are present at detectable levels in deeper layers, the data indicate that PCB concentrations in vernal pool soils generally decrease with depth (see Table 5-13).

As shown in Table 5-12 and 5-13, as well as on Figure 5-16 (below), average and median PCB concentrations in the vernal pool soils of Reach 5C are notably lower than those in Reaches 5A and 5B. (In Reach 6, the small sample size of 3 precludes any meaningful comparison.) Arithmetic mean concentrations for all samples from Reaches 5A and 5B are 25 and 28 mg/kg, respectively, compared to 2.9 mg/kg in Reach 5C (Table 5-12). The maximum PCB concentration measured in the surface soil layer of vernal pools in Reach 5C was only 26 mg/kg, compared to values of 874 mg/kg and 136 mg/kg in the surface layer of vernal pools in Reaches 5A and 5B, respectively. For all three reaches, the highest values have raised the averages upward, as evidenced by the median being considerably lower than the average in each case. The median PCB concentration is highest in Reach 5B (17 mg/kg) (Table 5-12). Comparing arithmetic mean PCB concentrations in vernal pool and floodplain soils from the 0- to 0.5-foot depth interval (Figures 5-7 and 5-16), vernal pool concentrations are higher than floodplain soil concentrations in samples from Reach 5A and 5B, but not Reach 5C.

Figure 5-16. Vernal Pool Soil Mean and Median PCB by Reach



Note:
Includes all EPA vernal pool data.

5.7 PCB Mass in Floodplain and Riverbank Soils

The PCB mass within the floodplain soil of the Rest of River area was estimated using the physical data (surface area, soil depth, and percent solids) and analytical data (dry-weight PCB concentrations) collected during the 1998-2002 sediment sampling activities. As discussed in Section 4.7, PCB mass estimates tend to be highly uncertain due to different methods of calculating mass, the spatial variability of both the physical and chemical characteristics of soil, the density and distribution of available data, the inherent need to extrapolate the representativeness of available data over large volumes of soil, and the compounding effect of combining all these uncertainties in the resulting mass estimates. In consideration of these factors, ranges of mass estimates are presented rather than a single value. As in the Section 4 calculations of sediment PCB mass, variations in the bulk density and PCB concentrations were estimated by two standard errors, and mass was calculated using the upper and lower limits of both factors. Mass estimates for the Housatonic River floodplain were generated for Reaches 5 through Reach 9. The following assumptions and procedures were applied:

- Floodplain surface areas in Reaches 5 and 6 were split into proximal and distal floodplain areas. The proximal area is defined as the floodplain area along the riverbank extending 50 feet into the floodplain perpendicular to the channel. The distal area represents the area extending from the proximal area to the 1 mg/kg isopleth. The proximal/distal area designation was made due to the observed higher PCB concentrations closer to the riverbank. Separate mass estimates were made for the proximal and distal floodplains in these reaches.

- PCB mass in Reaches 7, 8, and 9 were calculated only for proximal areas in these reaches, since the 1 mg/kg isopleth line is not established in these reaches and PCB concentrations in these reaches outside 50 feet from the River are generally low (greater than 60% of PCB results less than 1 mg/kg).

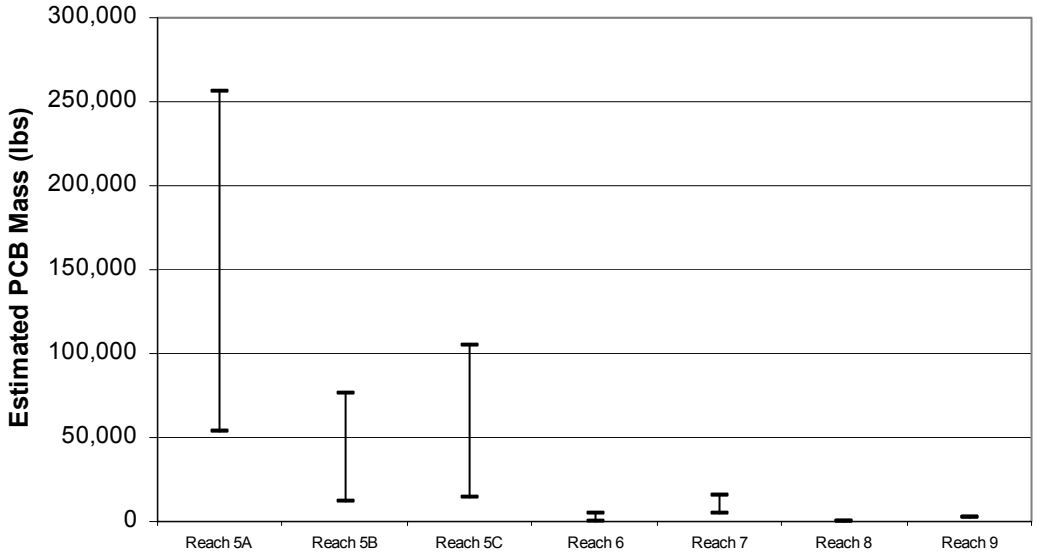
- In these calculations, all data from floodplain, riverbank, and vernal pool samples were used.

- Due to the lack of site-specific bulk density data, bulk density was estimated from site-specific percent solids data.

To estimate the PCB mass in these floodplain reaches and capture some of the observed differences in PCB concentration with depth, PCB mass was calculated for 6-inch depths within each reach to the vertical extent to which PCBs were detected. The first step in the calculation of the reach-specific PCB mass was to estimate the area over which PCBs were distributed. To facilitate this calculation, the percentage of PCBs detected within each depth interval was assumed to be representative of the fraction of the soil that contains PCBs. For example, if PCBs were detected in 96% of samples collected from the top 6 inches of floodplain soil in Reach 5A, then 96% of the 121-acre surface area of that floodplain reach was assumed to contain PCB mass, resulting in an area of 116 acres (i.e., 121 acres x 0.96 = 116 acres). This calculation was conducted for each 6-inch depth interval at which PCBs were detected and, for Reaches 5 and 6, for both the distal and proximal areas of the floodplain. After determining these areas, the volume of PCB-containing soil was determined as the product of the depth (i.e., 6 inches) and the estimated area over which PCB were detected. Corresponding with the calculated PCB-containing soil volume for each sediment depth interval, an upper and lower PCB concentration within each 6-inch depth increment was estimated as the reach-wide arithmetic mean of detected PCB concentration results plus and minus two standard errors. Similar upper and lower bounds were determined for reach-wide bulk density, estimated from percent solids data (see Table 5-14).

The PCB mass in each reach-specific depth interval was then estimated as the product of the PCB-containing soil volume, the upper and lower PCB concentrations, and the upper and lower sediment bulk density (estimated from percent solids data) within the specific reach and depth interval (see Table 5-14). The total PCB mass within the reach was calculated as the sum of those calculated for the individual depth intervals. Based on the calculation methods described above, the calculated ranges of PCB mass (in lbs of PCBs) are shown, per reach, in Table 5-14 and on Figure 5-17 (below), and are also summarized in Table 5-15 (below).

Figure 5-17. Estimated PCB Mass in Housatonic River Floodplain Soil



As can be seen, by far the greatest estimated mass of PCBs in the floodplain soils is present in Reach 5, with the majority residing in Reach 5A. The ranges of PCB mass shown above are the upper and lower bounds based on uncertainty in both the PCB and bulk density. When summed for the entire floodplain from the Confluence to the Connecticut border, these estimates produce an overall range of approximately 89,000 lbs to 460,000 lbs of PCBs, as shown in Table 5-15. Within Reach 5A, the estimated PCB mass is approximately evenly divided between the proximal and distal floodplain areas, while in the other reaches, the great majority of the estimated PCB mass (over 85%) is within the proximal floodplain areas (see Table 5-14).

Table 5-15. PCB Mass in Floodplain Soils

Reach	Range (lbs)		
Reach 5A	54,000	-	255,000
Reach 5B	12,300	-	76,000
Reach 5C	14,000	-	105,000
Reach 6	350	-	4,800
Reach 7	5,300	-	15,000
Reach 8	30	-	90
Reach 9	2,400	-	2,800
Rounded Total:	**89,000**	**-**	**460,000**

Note:

1. Total mass by reach is rounded sum of proximal and distal area estimates.
2. See Table 5-14 for detailed results by reach and area.

The large range of PCB mass estimates highlights the uncertainty inherent in the calculations. If the upper and lower bounds on PCB and bulk density are assessed separately, different estimates of PCB mass are calculated. If the PCB arithmetic mean of detected PCBs is used and the density is varied, the overall range of PCB mass is 240,000 lbs to 250,000 lbs. On the other hand, if a reach-wide arithmetic mean bulk-density value is used for each reach and PCBs are varied, the overall range of PCB mass is estimated to be 89,000 lbs to 460,000 lbs. The observed differences in the PCB mass estimated by varying these reach-specific values further demonstrate the uncertainties associated with the estimation of PCB mass.

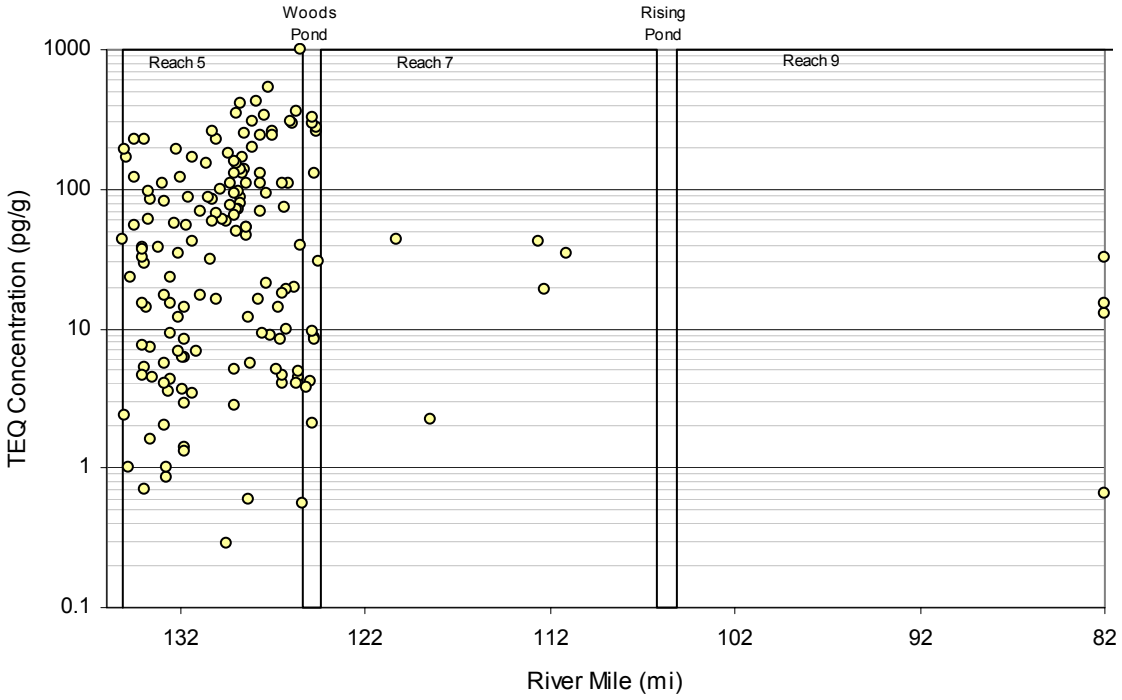
5.8 Nature and Extent of Other Constituents in Floodplain and Riverbank Soils

The majority of the floodplain and riverbank soil samples were analyzed for PCBs. In addition to the PCB analyses discussed in the previous subsections, analyses for non-PCB constituents were performed on a smaller subset of the floodplain, riverbank, and vernal pool soil samples. The other constituents analyzed for included SVOCs, pesticides, herbicides, PCDDs/PCDFs, cyanide, sulfide, and metals. Information on the frequency of detection of these constituents in floodplain and riverbank soils, as well as summary statistics on concentrations, are included in Appendix C.

As discussed in Section 2.6, EPA has advised GE that, based on EPA's human health and ecological screening evaluations, the non-PCB constituents, other than potentially PCDDs/PCDFs, are not key constituents of concern in the Rest of River. As a result, the extent of these constituents in the Rest of River floodplain and riverbank soils will not be evaluated further, except for a brief discussion of PCDD/PCDF compounds.

For PCDDs/PCDFs, review of the data indicates detection of a number of PCDD/PCDF compounds in floodplain soils. To evaluate these data further, a TEQ concentration was calculated for each sample using the TEFs published by the WHO and representing non-detected compounds as one-half the analytical detection limit. TEQ values calculated for the subset of floodplain and riverbank soil samples analyzed for PCDDs/PCDFs range from 0.29 pg/g (within Reach 5B) to 990 pg/g (within Reach 5C). Arithmetic means range from 15 pg/g (within Reach 9) to 140 pg/g (within Reach 5C). TEQs for soil samples collected from vernal pools range from 2 pg/g (within Reach 6) to 510 pg/g (within Reach 5C). Arithmetic means range from 28 pg/g (within Reach 6) to 120 pg/g (within Reach 5C). TEQ values are plotted by distance downstream of the Confluence on Figure 5-18 (below). These TEQ values show considerable variability within reaches, but are generally higher above Woods Pond and are lower in the few available samples downstream of Woods Pond Dam.

Figure 5-18. TEQ Concentration in the Housatonic River Floodplain



Note:
Includes all EPA floodplain and riverbank data with an associated river mile.

5.9 Summary

Considerable spatial variability in floodplain and riverbank soil PCB concentrations exists within the Rest of River area. Much of the variability can be accounted for by a number of factors. Several relevant findings are summarized below.

Overall, floodplain and riverbank soil PCB concentrations are highest within Reach 5, while average and median PCB concentrations all are much lower in Reaches 7, 8, and 9. These decreases indicate that PCB deposition in the sediments of Woods Pond and portions of the floodplains in Reaches 5 and 6 have significantly reduced downstream PCB transport. Median PCB concentrations are consistently lower than the averages, indicating the presence of a limited number of samples with higher PCB concentrations, which raise the averages above the central tendency values.

Within Reach 5, several factors account for the observed spatial distribution of PCBs. Riverbank soils tend to contain higher PCB concentrations than floodplain soils due to the increased contact that riverbanks have with surface water. Similarly, PCB concentrations in floodplain soils tend to be highest in areas that are closer to the River and thus are flooded more frequently. This is true in both Reach 5 and Reach 7 (between Woods Pond and Rising Pond), where most of the floodplain samples were collected. For example, average and median surface soil PCB concentrations within Reach 5 are highest in the 2-year floodplain and decrease progressively in the 2- to 10-year and 10- to 100-year floodplains. Floodplain data also show that large areas of the 2- to 10-year floodplain located away from the riverbank contained little or no detectable PCBs.

PCB concentrations vary with soil properties. In general, within a given reach, the highest PCB concentrations typically occur in samples containing lower percent solids, larger proportions of silts and clays, and higher organic carbon content. PCBs in floodplain soils appear to have low potential for remobilization to downstream areas, which is consistent with the analyses of physical properties and the assumption that flooding and subsequent settling of solids represent the primary mechanism of PCB transport to the Rest of River floodplain soils. Data from vernal pools generally showed that wetter, finer-grained, more organic soils occur at these locations than in the surrounding floodplain. PCB

concentrations in vernal pools are also higher in Reaches 5A and 5B than floodplain soils within the same reach.

As with the PCB mass estimates for sediments, estimates of PCB mass in the floodplain soils in the Rest of River area consist of large ranges, reflecting the uncertainties in the methods, data used, and calculations. These estimates of PCB mass in the Rest of River floodplain soils have resulted in an overall range of 89,000 lbs to 460,000 lbs of PCBs.

Other chemical constituents were also detected in floodplain, riverbank, and vernal pool samples, but are not the focus of this RFI Report, except for a brief discussion of PCDDs/PCDFs. For PCDDs/PCDFs, TEQ values range up to 990 pg/g (less than 1 μg/kg) and show higher values above Woods Pond than downstream of Woods Pond.

Section 5 Tables

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Table 5-1
Floodplain and Riverbank Soils
Summary of Sampling Activities/Investigations

Year	Lead Organization	Description and Purpose	No. of Locations/ Samples Collected	Analytical Parameters	Report Citation
1988 – 1989	GE/BBL	DeVos Property Sampling – Select sampling of the DeVos property in Lenox, MA to determine the presence of PCBs.	52 / 104	PCBs	BBEPC, Dec. 1991
1990	GE/BBL	MCP Phase II Investigation – Sampling of 10 transects within the Rest of River designated FP2 through FP11 to provide a representation of the PCBs present.	114 / 227	PCBs	BBEPC, Dec. 1991
1992	GE/BBL	MCP Phase II Investigation – Additional sampling at 2 of the original 10 transects (FP2 and FP7) to better define the extent of PCBs at these locations.	9 / 36	PCBs, TOC	BBEPC, Aug. 1992
1992 – 1994	GE/BBL	Floodplain Property Analysis – Conducted as part of MDEP-required activities to evaluate the need for short-term measures (STMs) at specific floodplain properties.	16 parcels / 89	PCBs, TOC	BBEPC, Oct. 1992; BBEPC, Feb. 1993; BBL, 1994
1994 – 1995	GE/BBL	Supplemental Phase II/RFI Investigation – Sampling at existing (10) and new (12) transects (22 total transects) to further define the horizontal and vertical extent of PCBs in floodplain soils downstream of the GE facility.	153 / 432	PCBs, TOC	BBL, 1996
1995	GE/BBL	Supplemental Phase II/RFI Investigation – Additional sampling at residential properties to define the extent of PCBs in floodplain soils.	2 parcels / 24	PCBs, TOC	BBL, 1996
1997 - 1998	GE/BBL	Additional sampling at floodplain properties to further define the extent of PCBs in floodplain soils.	6 parcels / 361	PCBs	---
1998 - 2002	USEPA/ Weston	USEPA Supplemental Investigation – Sampling to define the nature and extent of the soil contamination in the Housatonic River and associated floodplain by PCBs and other contaminants and to further delineate pathways of contaminant migration.	2,537 / 4,572	PCBs, TOC, Appendix IX (approx. 10% of samples)	---

Notes:
1. Only major sampling events are summarized.
2. Sample numbers do not include QC samples.

Table 5-3
Floodplain and Riverbank Soils
Solids Content by Reach (%) -- 1998-2002

All Data (Floodplain and Riverbank)							
Sampling Location	**Number of Samples**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Reach 5A	1159	76	74	75	74	0	100
Reach 5B	356	72	71	72	69	14	99
Reach 5C	583	61	59	61	58	8	99
Reach 6	131	67	63	67	59	9	97
Reach 7	1330	77	76	77	75	14	100
Reach 8	26	79	76	82	70	41	100
Reach 9	168	76	75	77	74	32	96
Floodplain							
Sampling Location	**Number of Samples**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Reach 5A	1019	76	75	76	74	0	100
Reach 5B	342	72	70	72	69	14	99
Reach 5C	563	61	59	61	58	8	99
Reach 6	131	67	63	67	59	9	97
Reach 7	1326	77	76	77	75	14	100
Reach 8	26	79	76	82	70	41	100
Reach 9	166	76	76	77	74	32	96
Riverbank							
Sampling Location	**Number of Samples**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Reach 5A	140	72	72	74	71	52	100
Reach 5B	14	75	73	78	68	54	92
Reach 5C	20	58	59	65	54	40	82
Reach 6	--	--	--	--	--	--	--
Reach 7	4	61	60	84	36	37	82
Reach 8	--	--	--	--	--	--	--
Reach 9	2	61	61	NA	NA	57	65

Notes:

1. All EPA data from all depths are included.
2. Non-detected values were assigned a value of one-half the detection limit prior to calculation.
3. Duplicate samples were averaged.
4. NA = Analysis not conducted due to sample size (n<3) and/or frequency of detection (0%).
5. -- No data collected.

Table 5-4
Floodplain and Riverbank Soils
Total Organic Carbon (TOC) by Reach (%) -- 1992-2002

All Data (Floodplain and Riverbank)								
Sampling Location	**Number of Samples**	**Frequency of Detection (%)**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Reach 5A	273	97	2.6	4.1	5.0	3.2	ND	90
Reach 5B	90	97	2.6	4.6	6.0	3.3	ND	48
Reach 5C	198	98	4.2	7.2	8.4	6.0	ND	45
Reach 6	20	100	3.4	4.8	6.7	3.0	1.4	16
Reach 7	120	100	3.9	4.9	5.6	4.2	1.0	25
Reach 8	10	100	2.6	3.3	4.4	2.2	1.6	6.9
Reach 9	30	100	2.0	2.6	3.5	1.6	0.56	15
Floodplain								
Sampling Location	**Number of Samples**	**Frequency of Detection (%)**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Reach 5A	243	96	2.6	4.3	5.3	3.3	ND	90
Reach 5B	85	96	2.7	4.8	6.2	3.3	ND	48
Reach 5C	192	99	4.3	7.3	8.5	6.1	ND	45
Reach 6	20	100	3.4	4.8	6.7	3.0	1.4	16
Reach 7	120	100	3.9	4.9	5.6	4.2	1.0	25
Reach 8	10	100	2.6	3.3	4.4	2.2	1.6	6.9
Reach 9	30	100	2.0	2.6	3.5	1.6	0.56	15
Riverbank								
Sampling Location	**Number of Samples**	**Frequency of Detection (%)**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Reach 5A	30	100	2.3	2.7	3.2	2.2	0.72	7.0
Reach 5B	5	100	2.3	2.4	3.3	1.5	1.3	3.9
Reach 5C	6	83	3.2	3.3	5.1	1.5	ND	5.8
Reach 6	--	--	--	--	--	--	--	--
Reach 7	--	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--	--

Notes:

1. All GE and EPA data from all depths are included.
2. Non-detected values were assigned a value of one-half the detection limit prior to calculation.
3. Duplicate samples were averaged.
4. ND = Not Detected.
5. -- No data collected.

Table 5-5
Floodplain and Riverbank Soils
Grain Size by Reach (%) -- 1998-2001

All Data (Floodplain and Riverbank)							
Sampling Location	**Number of Samples**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Percent Clay							
Reach 5A	180	6.8	8.3	9.1	7.5	0.0	39.0
Reach 5B	69	5.9	9.1	11.0	7.4	1.2	42.0
Reach 5C	138	13.0	14.0	16.0	13.0	1.5	40.0
Reach 6	13	7.1	9.0	12.0	6.4	3.0	20.0
Reach 7	78	8.0	8.5	9.7	7.4	0.7	27.0
Reach 8	--	--	--	--	--	--	--
Reach 9	4	9.5	10.0	13.0	7.4	7.5	14.0
Percent Gravel							
Reach 5A	180	0.0	2.7	3.7	1.6	0.0	63.0
Reach 5B	69	0.0	1.8	3.5	0.1	0.0	36.0
Reach 5C	138	0.0	3.1	4.8	1.4	0.0	62.0
Reach 6	13	2.2	11.0	19.0	3.2	0.0	36.0
Reach 7	78	3.0	9.0	12.0	6.3	0.0	50.0
Reach 8	--	--	--	--	--	--	--
Reach 9	4	0.0	0.0	0.0	0.0	0.0	0.0
Percent Sand							
Reach 5A	180	50.0	48.0	52.0	45.0	2.4	93.0
Reach 5B	69	53.0	49.0	55.0	44.0	8.3	85.0
Reach 5C	138	29.0	31.0	35.0	28.0	0.0	71.0
Reach 6	13	42.0	42.0	51.0	33.0	13.0	78.0
Reach 7	78	51.0	49.0	54.0	45.0	13.0	90.0
Reach 8	--	--	--	--	--	--	--
Reach 9	4	26.0	26.0	40.0	12.0	8.7	43.0
Percent Silt							
Reach 5A	180	40.0	41.0	44.0	38.0	4.0	79.0
Reach 5B	69	39.0	40.0	44.0	35.0	11.0	74.0
Reach 5C	138	57.0	51.0	54.0	48.0	3.1	79.0
Reach 6	13	31.0	38.0	48.0	28.0	16.0	68.0
Reach 7	78	30.0	33.0	37.0	29.0	2.1	73.0
Reach 8	--	--	--	--	--	--	--
Reach 9	4	65.0	64.0	77.0	51.0	48.0	77.0

Table 5-5
Floodplain and Riverbank Soils
Grain Size by Reach (%) -- 1998-2001

Floodplain							
Sampling Location	**Number of Samples**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Percent Clay							
Reach 5A	142	7.2	8.6	9.6	7.7	0.0	39.0
Reach 5B	50	7.6	10.0	12.0	7.8	1.2	42.0
Reach 5C	132	13.0	14.0	16.0	13.0	1.5	40.0
Reach 6	13	7.1	9.0	12.0	6.4	3.0	20.0
Reach 7	78	8.0	8.5	9.7	7.4	0.7	27.0
Reach 8	--	--	--	--	--	--	--
Reach 9	4	9.5	10.0	13.0	7.4	7.5	14.0
Percent Gravel							
Reach 5A	142	0.0	2.9	3.8	1.9	0.0	29.0
Reach 5B	50	0.0	2.5	4.8	0.2	0.0	36.0
Reach 5C	132	0.0	3.2	5.0	1.4	0.0	62.0
Reach 6	13	2.2	11.0	19.0	3.2	0.0	36.0
Reach 7	78	3.0	9.0	12.0	6.3	0.0	50.0
Reach 8	--	--	--	--	--	--	--
Reach 9	4	0.0	0.0	0.0	0.0	0.0	0.0
Percent Sand							
Reach 5A	142	44.0	45.0	49.0	42.0	2.4	93.0
Reach 5B	50	43.0	44.0	51.0	38.0	8.3	85.0
Reach 5C	132	29.0	31.0	34.0	28.0	0.0	71.0
Reach 6	13	42.0	42.0	51.0	33.0	13.0	78.0
Reach 7	78	51.0	49.0	54.0	45.0	13.0	90.0
Reach 8	--	--	--	--	--	--	--
Reach 9	4	26.0	26.0	40.0	12.0	8.7	43.0
Percent Silt							
Reach 5A	142	43.0	43.0	47.0	40.0	4.0	79.0
Reach 5B	50	46.0	43.0	49.0	38.0	11.0	74.0
Reach 5C	132	57.0	51.0	54.0	49.0	3.1	79.0
Reach 6	13	31.0	38.0	48.0	28.0	16.0	68.0
Reach 7	78	30.0	33.0	37.0	29.0	2.1	73.0
Reach 8	--	--	--	--	--	--	--
Reach 9	4	65.0	64.0	77.0	51.0	48.0	77.0

Table 5-5
Floodplain and Riverbank Soils
Grain Size by Reach (%) -- 1998-2001

Riverbank							
Sampling Location	**Number of Samples**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Percent Clay							
Reach 5A	38	4.9	7.1	8.7	5.4	1.0	23.0
Reach 5B	19	5.4	6.7	8.3	5.2	4.0	16.0
Reach 5C	6	8.3	9.1	13.0	5.5	4.3	17.0
Reach 6	--	--	--	--	--	--	--
Reach 7	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--
Percent Gravel							
Reach 5A	38	0.0	1.9	5.2	< 0	0.0	63.0
Reach 5B	19	0.0	0.0	0.0	0.0	0.0	0.0
Reach 5C	6	0.0	1.2	3.1	< 0	0.0	6.1
Reach 6	--	--	--	--	--	--	--
Reach 7	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--
Percent Sand							
Reach 5A	38	64	59	65	53	14	83
Reach 5B	19	67	63	71	56	32	83
Reach 5C	6	46	41	55	27	13	58
Reach 6	--	--	--	--	--	--	--
Reach 7	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--
Percent Silt							
Reach 5A	38	26.0	32.0	37.0	27.0	4.3	73.0
Reach 5B	19	27.0	30.0	36.0	24.0	12.0	53.0
Reach 5C	6	47.0	49.0	61.0	37.0	32.0	70.0
Reach 6	--	--	--	--	--	--	--
Reach 7	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--

Notes:

1. All EPA data from all depths are included.
2. Non-detected values were assigned a value of one-half the detection limit prior to calculation.
3. Duplicate samples were averaged.
4. -- No data collected.

Table 5-6
Floodplain and Riverbank Soils
Total PCB by Reach (mg/kg) -- 1988-2002

All Soils (Floodplain and Riverbank								
Sampling Location	**Number of Samples**	**Frequency of Detection (%)**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Reach 5A	1755	77	2.8	15	17	14	ND	395
Reach 5B	687	80	6.6	18	20	16	ND	230
Reach 5C	1083	64	0.74	14	17	12	ND	907
Reach 6	167	61	0.56	14	20	9.0	ND	321
Reach 7	1713	67	0.57	2.1	2.3	1.9	ND	38
Reach 8	48	69	0.27	0.80	1.2	0.43	ND	6.0
Reach 9	347	56	0.25	0.42	0.48	0.36	ND	6.3
Floodplain Soils								
Sampling Location	**Number of Samples**	**Frequency of Detection (%)**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Reach 5A	1605	75	2.3	15	17	14	ND	395
Reach 5B	648	80	6.4	18	20	16	ND	230
Reach 5C	1055	64	0.70	14	16	11	ND	907
Reach 6	165	61	0.55	14	20	8.9	ND	321
Reach 7	1709	67	0.57	2.1	2.3	1.9	ND	38
Reach 8	48	69	0.27	0.80	1.2	0.43	ND	6.0
Reach 9	333	55	0.25	0.42	0.48	0.35	ND	6.3
Riverbank Soils								
Sampling Location	**Number of Samples**	**Frequency of Detection (%)**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Reach 5A	150	89	11	16	19	13	ND	117
Reach 5B	39	90	8.6	15	20	9.6	ND	62
Reach 5C	28	96	10	30	49	12	ND	171
Reach 6	2	100	21	21	NA	NA	9.8	25
Reach 7	4	75	0.60	0.64	1.0	0.26	ND	1.1
Reach 8	--	--	--	--	--	--	--	--
Reach 9	14	71	0.34	0.48	0.65	0.32	ND	1.2

Notes:

1. All GE and EPA data from all depths are included.
2. Non-detected values were assigned a value of one-half the detection limit prior to calculation.
3. Duplicate samples were averaged.
4. ND = Not Detected.
5. NA = Analysis not conducted due to sample size (n<3) and/or frequency of detection (0%).
6. -- No data collected.

Table 5-7
Floodplain and Riverbank Soils
Total PCB Data by Reach and Depth (mg/kg) -- 1988-2002

All Soils (Floodplain and Riverbank)								
Depth Interval (inch)	**Number of Samples**	**Frequency of Detection (%)**	**Median**	**Arithmetic Mean**	**+2 Standard Errors**	**-2 Standard Errors**	**Minimum**	**Maximum**
Reach 5A - Confluence of the East and West Branch of the Housatonic River to Upstream of the WWTP								
0-6	886	84	5.6	15	16	13	ND	235
6-12	493	64	0.66	12	14	9.8	ND	209
12-18	138	75	1.5	24	33	15	ND	395
18-24	42	62	0.30	21	37	4.7	ND	199
24-30	114	68	0.71	17	26	9.4	ND	257
30-36	22	73	0.50	12	22	1.6	ND	98
36-42	13	77	0.78	14	27	0.89	ND	69
42-48	11	82	0.33	11	20	1.7	ND	39
48-54	9	100	0.35	7.3	18	< 0	0.090	48
54-60	6	100	7.2	30	74	< 0	0.082	140
60-66	6	83	13	36	81	< 0	ND	140
66-72	2	100	7.1	7.1	NA	NA	2.2	12
72-78	3	67	5.8	7.9	19	< 0	ND	18
78-84	4	25	0.011	14	43	< 0	ND	57
84-90	5	80	33	37	71	2.0	ND	88
108-114	1	0	NA	ND	NA	NA	NA	NA
Reach 5B - Downstream of WWTP to Upstream of the Roaring Brook Confluence								
0-6	365	85	10	19	22	16	ND	230
6-12	112	78	5.0	17	22	12	ND	164
12-18	54	78	3.3	23	34	12	ND	204
18-24	7	100	13	26	62	< 0	0.18	130
24-30	50	60	0.61	13	24	2.3	ND	219
30-36	6	100	8.2	20	45	< 0	0.28	83
36-42	6	100	1.2	13	36	< 0	0.30	71
42-48	5	80	0.55	2.1	4.5	< 0	ND	6.4
48-54	5	80	0.13	0.51	1.0	< 0	ND	1.3
54-60	5	60	0.032	0.38	0.81	< 0	ND	1.0
60-66	1	100	NA	1.7	NA	NA	NA	NA
66-72	1	0	NA	ND	NA	NA	NA	NA
72-78	2	0	NA	ND	NA	NA	ND	NA
78-84	3	0	NA	ND	NA	NA	ND	NA
84-90	1	100	NA	0.11	NA	NA	NA	NA
Reach 5C - Upstream of Roaring Brook Confluence to Headwaters of Woods Pond								
0-6	641	69	1.0	12	14	9.7	ND	334
6-12	236	55	0.37	13	18	8.7	ND	249
12-18	84	62	1.2	21	29	12	ND	220
18-24	13	62	0.28	26	70	< 0	ND	280
24-30	74	58	0.46	34	62	5.6	ND	907
30-36	4	100	3.1	34	98	< 0	0.30	130
36-42	2	100	0.57	0.57	NA	NA	0.29	0.84
42-48	3	100	0.40	2.8	7.6	< 0	0.25	7.6
48-54	4	75	7.7	14	33	< 0	ND	41
54-60	4	75	0.12	3.8	11	< 0	ND	15
60-66	2	50	0.21	0.21	NA	NA	ND	0.42
66-72	1	0	NA	ND	NA	NA	NA	NA
72-78	1	0	NA	ND	NA	NA	NA	NA
78-84	1	0	NA	ND	NA	NA	NA	NA
84-90	4	25	0.012	0.015	0.022	0.0073	ND	0.025
90-96	1	0	NA	ND	NA	NA	NA	NA

Table 5-7
Floodplain and Riverbank Soils
Total PCB Data by Reach and Depth (mg/kg) -- 1988-2002

Depth Interval (inch)	Number of Samples	Frequency of Detection (%)	Median	Arithmetic Mean	+2 Standard Errors	-2 Standard Errors	Minimum	Maximum
Reach 6 - Woods Pond								
0-6	98	70	1.0	19	27	11	ND	321
6-12	18	50	0.41	14	29	< 0	ND	130
12-18	24	50	0.29	12	24	< 0	ND	137
24-30	24	38	0.25	1.4	3.0	< 0	ND	20
Reach 7 - Woods Pond Dam to Rising Pond								
0-6	751	79	1.1	2.4	2.7	2.1	ND	38
6-12	396	67	0.40	1.9	2.3	1.6	ND	29
12-18	246	57	0.47	2.2	2.7	1.7	ND	28
18-24	36	81	1.2	4.2	6.5	1.9	ND	22
24-30	216	43	0.25	1.3	1.8	0.88	ND	34
30-36	23	74	0.37	1.3	2.6	< 0	ND	15
36-42	23	48	0.091	2.8	6.2	< 0	ND	38
42-48	11	45	0.063	0.69	1.6	< 0	ND	5.3
48-54	7	14	0.065	0.16	0.37	< 0	ND	0.77
54-60	2	50	1.5	1.5	NA	NA	ND	3.0
60-66	2	50	0.16	0.16	NA	NA	ND	0.25
Reach 8 - Rising Pond								
0-6	23	74	0.25	1.0	1.7	0.35	ND	6.0
6-12	22	59	0.25	0.63	1.0	0.23	ND	3.9
12-18	1	100	NA	0.39	NA	NA	NA	NA
18-24	1	100	NA	0.39	NA	NA	NA	NA
24-30	1	100	NA	0.39	NA	NA	NA	NA
Reach 9 - Downstream of Rising Pond Dam to Connecticut Border								
0-6	167	62	0.26	0.38	0.43	0.32	ND	1.7
6-12	167	51	0.25	0.45	0.55	0.34	ND	6.3
12-18	4	100	1.5	1.7	3.4	< 0	0.14	3.7
18-24	4	25	0.14	0.27	0.62	< 0	ND	0.77
24-30	3	0	NA	ND	NA	NA	ND	NA
30-36	2	0	NA	ND	NA	NA	ND	NA
Floodplain Soils								
Reach 5A - Confluence of the East and West Branch of the Housatonic River to Upstream of the WWTP								
0-6	817	83	4.9	15	17	13	ND	235
6-12	432	61	0.50	11	14	8.9	ND	209
12-18	132	74	1.5	24	33	15	ND	395
18-24	42	62	0.30	21	37	4.7	ND	199
24-30	108	67	0.60	17	26	8.6	ND	257
30-36	22	73	0.50	12	22	1.6	ND	98
36-42	13	77	0.78	14	27	0.89	ND	69
42-48	11	82	0.33	11	20	1.7	ND	39
48-54	9	100	0.35	7.3	18	< 0	0.090	48
54-60	6	100	7.2	30	74	< 0	0.082	140
60-66	6	83	13	36	81	< 0	ND	140
66-72	2	100	7.1	7.1	NA	NA	2.2	12
72-78	3	67	5.8	7.9	19	< 0	ND	18
78-84	4	25	0.011	14	43	< 0	ND	57
84-90	5	80	33	37	71	2.0	ND	88
108-114	1	0	NA	ND	NA	NA	NA	NA

Table 5-7
Floodplain and Riverbank Soils
Total PCB Data by Reach and Depth (mg/kg) -- 1988-2002

Depth Interval (inch)	Number of Samples	Frequency of Detection (%)	Median	Arithmetic Mean	+2 Standard Errors	-2 Standard Errors	Minimum	Maximum
Reach 5B - Downstream of WWTP to Upstream of the Roaring Brook Confluence								
0-6	347	85	10	19	22	17	ND	230
6-12	94	76	4.5	17	23	11	ND	164
12-18	54	78	3.3	23	34	12	ND	204
18-24	7	100	13	26	62	< 0	0.18	130
24-30	50	60	0.61	13	24	2.3	ND	219
30-36	6	100	8.2	20	45	< 0	0.28	83
36-42	6	100	1.2	13	36	< 0	0.30	71
42-48	5	80	0.55	2.1	4.5	< 0	ND	6.4
48-54	5	80	0.13	0.51	1.0	< 0	ND	1.3
54-60	5	60	0.032	0.38	0.81	< 0	ND	1.0
60-66	1	100	NA	1.7	NA	NA	NA	NA
66-72	1	0	NA	ND	NA	NA	NA	NA
72-78	2	0	NA	ND	NA	NA	ND	NA
78-84	3	0	NA	ND	NA	NA	ND	NA
84-90	1	100	NA	0.11	NA	NA	NA	NA
Reach 5C - Upstream of Roaring Brook Confluence to Headwaters of Woods Pond								
0-6	628	68	0.95	11	13	9.3	ND	334
6-12	231	54	0.36	13	17	8.2	ND	249
12-18	80	60	0.86	21	30	12	ND	220
18-24	13	62	0.28	26	70	< 0	ND	280
24-30	70	57	0.41	32	62	3.0	ND	907
30-36	4	100	3.1	34	98	< 0	0.30	130
36-42	2	100	0.57	0.57	NA	NA	0.29	0.84
42-48	3	100	0.40	2.8	7.6	< 0	0.25	7.6
48-54	4	75	7.7	14	33	< 0	ND	41
54-60	4	75	0.12	3.8	11	< 0	ND	15
60-66	2	50	0.21	0.21	NA	NA	ND	0.42
66-72	1	0	NA	ND	NA	NA	NA	NA
72-78	1	0	NA	ND	NA	NA	NA	NA
78-84	1	0	NA	ND	NA	NA	NA	NA
84-90	4	25	0.012	0.015	0.022	0.0073	ND	0.025
90-96	1	0	NA	ND	NA	NA	NA	NA
Reach 6 - Woods Pond								
0-6	97	70	1.0	19	27	11	ND	321
6-12	17	47	0.32	14	30	< 0	ND	130
12-18	24	50	0.29	12	24	< 0	ND	137
24-30	24	38	0.25	1.4	3.0	< 0	ND	20
Reach 7 - Woods Pond Dam to Rising Pond								
0-6	749	79	1.1	2.4	2.7	2.1	ND	38
6-12	394	67	0.40	1.9	2.3	1.6	ND	29
12-18	246	57	0.47	2.2	2.7	1.7	ND	28
18-24	36	81	1.2	4.2	6.5	1.9	ND	22
24-30	216	43	0.25	1.3	1.8	0.88	ND	34
30-36	23	74	0.37	1.3	2.6	< 0	ND	15
36-42	23	48	0.091	2.8	6.2	< 0	ND	38
42-48	11	45	0.063	0.69	1.6	< 0	ND	5.3
48-54	7	14	0.065	0.16	0.37	< 0	ND	0.77
54-60	2	50	1.5	1.5	NA	NA	ND	3.0
60-66	2	50	0.16	0.16	NA	NA	ND	0.25

Table 5-7
Floodplain and Riverbank Soils
Total PCB Data by Reach and Depth (mg/kg) -- 1988-2002

Depth Interval (inch)	Number of Samples	Frequency of Detection (%)	Median	Arithmetic Mean	+2 Standard Errors	-2 Standard Errors	Minimum	Maximum
Reach 8 - Rising Pond								
0-6	23	74	0.25	1.0	1.7	0.35	ND	6.0
6-12	22	59	0.25	0.63	1.0	0.23	ND	3.9
12-18	1	100	NA	0.39	NA	NA	NA	NA
18-24	1	100	NA	0.39	NA	NA	NA	NA
24-30	1	100	NA	0.39	NA	NA	NA	NA
Reach 9 - Rising Pond Dam to Connecticut Border								
0-6	161	61	0.25	0.38	0.43	0.32	ND	1.7
6-12	161	50	0.25	0.44	0.55	0.33	ND	6.3
12-18	3	100	2.6	2.1	4.3	0.042	0.14	3.7
18-24	3	33	0.024	0.27	0.77	< 0	ND	0.77
24-30	3	0	NA	ND	NA	NA	ND	NA
30-36	2	0	NA	ND	NA	NA	ND	NA
Riverbank Solis								
Reach 5A - Confluence of the East and West Branch of the Housatonic River to Upstream of the WWTP								
0-6	69	96	12	14	17	11	ND	71
6-12	61	82	11	17	22	11	ND	117
12-18	6	83	13	16	30	3.2	ND	40
24-30	6	83	5.0	25	55	< 0	ND	86
Reach 5B - Downstream of WWTP to Upstream of the Roaring Brook Confluence								
0-6	18	89	6.0	11	16	5.3	ND	36
6-12	18	89	6.5	19	29	9.7	ND	62
Reach 5C - Upstream of Roaring Brook Confluence to Headwaters of Woods Pond								
0-6	13	100	11	28	53	3.5	2.3	163
6-12	5	100	11	44	109	< 0	1.2	171
12-18	4	100	8.7	9.9	18	1.6	1.1	21
24-30	4	75	47	54	118	< 0	ND	123
Reach 6 - Woods Pond								
0-6	1	100	NA	24	NA	NA	NA	NA
6-12	1	100	NA	17	NA	NA	NA	NA
Reach 7 - Woods Pond Dam to Rising Pond								
0-6	2	100	0.60	0.60	NA	NA	0.44	0.76
6-12	2	50	0.68	0.68	NA	NA	ND	1.1
Reach 9 - Rising Pond Dam to Connecticut Border								
0-6	6	67	0.29	0.39	0.56	0.21	ND	0.80
6-12	6	83	0.54	0.63	0.95	0.32	ND	1.2
12-18	1	100	NA	0.36	NA	NA	NA	NA
18-24	1	0	NA	ND	NA	NA	NA	NA

Notes:
1. All GE and EPA data are included.
2. Non-detected values were assigned a value of one-half the detection limit prior to calculation.
3. Duplicate samples were averaged.
4. Data were depth-weighted (as necessary) to provide representative and comparable values for 6-inch increments (e.g., 0-6, 6-12, etc.)
5. ND = Not Detected.
6. NA = Analysis not conducted due to sample size (n<3) and/or frequency of detection (0%).
7. -- No data collected.

Table 5-9
Vernal Pool Soils
Solids Content by Reach (%) -- 1998-2002

Sampling Location	Number of Samples	Median	Arithmetic Mean	+2 Standard Errors	-2 Standard Errors	Minimum	Maximum
Reach 5A	171	53	50	53	48	5.9	94
Reach 5B	100	49	48	50	46	16	80
Reach 5C	45	47	49	55	43	13	96
Reach 6	2	41	41	NA	NA	32	50
Reach 7	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--

Notes:

1. All EPA data queried as "VP" samples from the "Location Type" field in the November 2002 EPA database from all depths are included.
2. Non-detected values were assigned a value of one-half the detection limit prior to calculation.
3. Duplicate samples were averaged.
4. NA = Analysis not conducted due to sample size (n<3) and/or frequency of detection (0%).
5. -- No data collected.

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Table 5-10
Vernal Pool Soils
Total Organic Carbon (TOC) by Reach (%) -- 1998-2002

Sampling Location	Number of Samples	Detection Frequency (%)	Median	Arithmetic Mean	+2 Standard Errors	-2 Standard Errors	Minimum	Maximum
Reach 5A	190	95	8.8	12	14	10	ND	85
Reach 5B	107	100	13	15	17	13	1.6	51
Reach 5C	61	93	9.4	15	19	10	ND	78
Reach 6	2	100	30	30	NA	NA	24	35
Reach 7	--	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--	--

Notes:

1. All EPA data queried as "VP" samples from the "Location Type" field in the November 2002 EPA database from all depths are included.
2. Non-detected values were assigned a value of one-half the detection limit prior to calculation.
3. Duplicate samples were averaged.
4. NA = Analysis not conducted due to sample size (n<3) and/or frequency of detection (0%).
5. ND = Not Detected.
6. -- No data collected.

Table 5-11
Vernal Pool Soils
Grain Size by Reach (%) -- 1998-2000

Sampling Location	Number of Samples	Median	Arithmetic Mean	+2 Standard Errors	-2 Standard Errors	Minimum	Maximum
Percent Clay							
Reach 5A	186	17.0	17.0	18.0	16.0	1.5	40.0
Reach 5B	105	17.0	17.0	19.0	16.0	4.4	37.0
Reach 5C	61	15.0	16.0	18.0	14.0	2.6	41.0
Reach 6	5	26.0	22.0	31.0	13.0	5.0	29.0
Reach 7	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--
Percent Gravel							
Reach 5A	186	0.0	1.4	2.0	0.7	0.0	35.0
Reach 5B	105	0.0	0.2	0.3	0.1	0.0	3.9
Reach 5C	61	0.0	1.0	1.7	0.4	0.0	14.0
Reach 6	5	0.0	0.0	0.1	< 0	0.0	0.1
Reach 7	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--
Percent Sand							
Reach 5A	186	19.0	24.0	27.0	22.0	0.0	89.0
Reach 5B	105	15.0	19.0	22.0	16.0	0.0	76.0
Reach 5C	61	22.0	25.0	31.0	19.0	0.0	87.0
Reach 6	5	0.1	1.7	3.8	< 0	0.1	5.1
Reach 7	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--
Percent Silt							
Reach 5A	186	62.0	57.0	60.0	55.0	5.7	97.0
Reach 5B	105	65.0	63.0	65.0	61.0	19.0	88.0
Reach 5C	61	58.0	58.0	62.0	53.0	9.3	89.0
Reach 6	5	73.0	76.0	86.0	67.0	68.0	95.0
Reach 7	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--

Notes:

1. All EPA data queried as "VP" samples from the "Location Type" field in the November 2002 EPA database from all depths are included.
2. Non-detected values were assigned a value of one-half the detection limit prior to calculation.
3. Duplicate samples were averaged.
4. -- No data collected.

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Table 5-12
Vernal Pool Soils
Total PCB by Reach (mg/kg) -- 1998-2002

Sampling Location	Number of Samples	Detection Frequency (%)	Median	Arithmetic Mean	+2 Standard Errors	-2 Standard Errors	Minimum	Maximum
Reach 5A	226	84	7.5	25	33	16	ND	874
Reach 5B	132	95	17	28	33	23.0	ND	136
Reach 5C	72	53	0.77	2.9	4.1	1.7	ND	26
Reach 6	3	100	3.2	38	109	< 0	2.3	109
Reach 7	--	--	--	--	--	--	--	--
Reach 8	--	--	--	--	--	--	--	--
Reach 9	--	--	--	--	--	--	--	--

Notes:

1. All EPA data from queried as "VP" samples from the "Location Type" field in the November 2002 EPA database from all depths are included.
2. Non-detected values were assigned a value of one-half the detection limit prior to calculation.
3. Duplicate samples were averaged.
4. ND = Not Detected.
5. -- No data collected.

Table 5-13
Summary of Vernal Pool Soils
Total PCB Data by Reach and Depth (mg/kg) -- 1998-2002

Depth Interval (in)	Number of Samples	Frequency of Detection (%)	Median	Arithmetic Mean	+2 Standard Errors	-2 Standard Errors	Minimum	Maximum
Reach 5A - Confluence of the East and West Branch of the Housatonic River to Upstream of the WWTP								
0-6	206	83	9.0	26	35	17	ND	874
6-12	7	71	2.3	8.3	18	< 0	ND	33
12-18	2	100	27	27	NA	NA	7.8	46
24-30	2	50	0.85	0.85	NA	NA	ND	1.1
Reach 5B - Downstream of WWTP to Upstream of the Roaring Brook Confluence								
0-6	121	94	19	28	34	23	ND	136
6-12	3	100	12	13	17	8.5	9.4	17
12-18	1	100	NA	9.9	NA	NA	NA	NA
24-30	1	100	NA	0.81	NA	NA	NA	NA
Reach 5C - Upstream of Roaring Brook Confluence to Headwaters of Woods Pond								
0-6	63	51	0.78	3.2	4.5	1.8	ND	26
6-12	3	67	0.45	0.82	1.8	< 0	ND	1.8
12-18	1	100	NA	0.87	NA	NA	NA	NA
24-30	1	0	NA	ND	NA	NA	NA	NA
Reach 6 - Woods Pond								
0-6	3	100	3.2	38	109	< 0	2.3	109

Notes:

1. All EPA data queried as "VP" samples from the "Location Type" field in the November 2002 EPA database are included.
2. Non-detected values were assigned a value of one-half the detection limit prior to calculation.
3. Duplicate samples were averaged.
4. Data were depth-weighted (as necessary) to provide representative and comparable values for 6-inch increments (e.g., 0-6, 6-12, etc.)
5. ND = Not Detected.
6. NA = Analysis not conducted due to sample size (n<3) and/or frequency of detection (0%).

Table 5-14
Summary of Housatonic River Floodplain Soil PCB Mass Estimate

Total Area (acre)	Depth (inch)	Number of Detected Samples[1]	Bulk Density[2] (g/cm^3)		Depth Weighted PCB[3] (mg/kg)		Percent Detected	Area[4] (acre)	PCB Mass[5] (lbs)	
			+2 Std Error	-2 Std Error	+2 Std Error	-2 Std Error			+2 Std Error	-2 Std Error
Reach 5A - Confluence of the East and West Branch of the Housatonic River to Upstream of the WWTP										
					Proximal Floodplain[6]					
121	0-6	277	1.4	1.4	29	22	96	116	6,550	4,903
	6-12	141	1.4	1.4	34	22	85	104	6,702	4,321
	12-18	52	1.4	1.4	56	21	85	103	11,256	4,054
	18-24	13	1.4	1.4	93	9	81	98	17,645	1,754
	24-30	47	1.4	1.4	48	17	78	95	8,759	3,038
	30-36	10	1.4	1.4	39	0	71	87	6,437	0
	36-42	7	1.4	1.4	39	0	78	94	7,184	0
	42-48	6	1.4	1.4	25	1.7	75	91	4,351	289
	48-54	6	1.4	1.4	6.8	0	100	121	1,586	0
	54-60	5	1.4	1.4	86	0	100	121	20,063	0
	60-66	4	1.4	1.4	114	0	80	97	21,428	0
	66-72	1	1.4	1.4	2.2	2.2	100	121	515	502
	72-78	1	1.4	1.4	18	18	50	61	2,106	2,054
	78-84	1	1.4	1.4	57	57	25	30	3,334	3,252
	84-90	4	1.4	1.4	84	7.9	80	97	15,652	1,442
	Total								**133,567**	**25,608**
					Distal Floodplain[7]					
204	0-6	587	1.4	1.4	23	15	86	176	7,691	5,139
	6-12	156	1.4	1.4	17	8.5	66	135	4,408	2,157
	12-18	50	1.4	1.4	41	12	74	150	11,861	3,511
	18-24	12	1.4	1.4	44	0	60	122	10,293	0
	24-30	30	1.4	1.4	32	0	63	127	7,979	0
	30-36	6	1.4	1.4	29	0	86	175	9,658	0
	36-42	3	1.4	1.4	46	0	100	204	17,902	0
	42-48	3	1.4	1.4	39	0	100	204	15,344	0
	48-54	3	1.4	1.4	48	0	100	204	18,885	0
	54-60	1	1.4	1.4	23	23	100	204	9,049	8,825
	60-66	1	1.4	1.4	4.6	4.6	100	204	1,810	1,765
	66-72	1	1.4	1.4	12	12	100	204	4,721	4,605
	72-78	1	1.4	1.4	5.8	5.8	100	204	2,282	2,226
	Total								**121,883**	**28,227**
								Reach Total	**255,450**	**53,835**

Table 5-14
Summary of Housatonic River Floodplain Soil PCB Mass Estimate

Total Area (acre)	Depth (inch)	Number of Detected Samples[1]	Bulk Density[2] (g/cm[3])		Depth Weighted PCB[3] (mg/kg)		Percent Detected	Area[4] (acre)	PCB Mass[5] (lbs)	
			+2 Std Error	-2 Std Error	+2 Std Error	-2 Std Error			+2 Std Error	-2 Std Error
Reach 5B - Downstream of WWTP to Upstream of the Roaring Brook Confluence										
					Proximal Floodplain[6]					
92	0-6	147	1.3	1.2	29	21	95	88	4,589	3,052
	6-12	45	1.3	1.2	31	18	92	85	4,699	2,464
	12-18	26	1.3	1.2	56	19	90	83	8,251	2,576
	18-24	4	1.3	1.2	99	0	100	92	16,379	0
	24-30	23	1.3	1.2	49	4.6	82	76	6,604	575
	30-36	4	1.3	1.2	64	0	100	92	10,605	0
	36-42	3	1.3	1.2	71	0	100	92	11,705	0
	42-48	3	1.3	1.2	6.4	0	100	92	1,056	0
	48-54	2	1.3	1.2	1.5	0.85	67	61	159	87
	54-60	3	1.3	1.2	1.2	0.022	75	69	149	2
	60-66	1	1.3	1.2	1.7	1.7	100	92	280	260
	84-90	1	1.3	1.2	0.11	0.11	100	92	18	17
	Total								**64,496**	**9,033**
					Distal Floodplain[7]					
53	0-6	254	1.3	1.2	29	22	89	48	2,506	1,731
	6-12	38	1.3	1.2	34	12.2	84	45	2,758	913
	12-18	16	1.3	1.2	35	0	67	36	2,243	0
	18-24	3	1.3	1.2	26	0	100	53	2,503	0
	24-30	8	1.3	1.2	6.4	0.83	38	20	235	28
	30-36	2	1.3	1.2	10	5.4	100	53	976	479
	36-42	3	1.3	1.2	3.2	0	100	53	303	0
	42-48	1	1.3	1.2	3.2	3.2	50	27	153	142
	48-54	2	1.3	1.2	0.14	0.12	100	53	13	10
	Total								**11,690**	**3,303**
							Reach Total		**76,186**	**12,336**

Table 5-14
Summary of Housatonic River Floodplain Soil PCB Mass Estimate

Total Area (acre)	Depth (inch)	Number of Detected Samples[1]	Bulk Density[2] (g/cm[3])		Depth Weighted PCB[3] (mg/kg)		Percent Detected	Area[4] (acre)	PCB Mass[5] (lbs)	
			+2 Std Error	-2 Std Error	+2 Std Error	-2 Std Error			+2 Std Error	-2 Std Error
Reach 5C - Upstream of Roaring Brook Confluence to Headwaters of Woods Pond										
					Proximal Floodplain[6]					
164	0-6	221	0.98	0.91	28	18	97	158	5,915	3,533
	6-12	73	0.98	0.91	47	23	84	138	8,804	3,931
	12-18	44	0.98	0.91	53	24	83	136	9,808	4,106
	18-24	7	0.98	0.91	128	0	88	143	24,716	0
	24-30	39	0.98	0.91	115	12	76	125	19,440	1,846
	30-36	4	0.98	0.91	98	0	100	164	21,699	0
	36-42	2	0.98	0.91	1.1	0.015	100	164	247	3
	42-48	3	0.98	0.91	7.6	0	100	164	1,681	0
	48-54	3	0.98	0.91	42.6	0	75	123	7,062	0
	54-60	3	0.98	0.91	15	0	75	123	2,489	0
	60-66	1	0.98	0.91	0.42	0.42	50	82	46	43
	84-90	1	0.98	0.91	0.025	0.025	25	41	1	1
	Total								**101,908**	**13,464**
					Distal Floodplain[7]					
91	0-6	220	0.98	0.91	14	9	66	60	1,140	642
	6-12	47	0.98	0.91	19	3.8	59	54	1,368	258
	12-18	8	0.98	0.91	4.0	0.84	32	29	158	31
	18-24	1	0.98	0.91	0.13	0.13	100	91	16	15
	24-30	4	0.98	0.91	3.5	0.17	19	17	81	4
	Total								**2,763**	**950**
								Reach Total	**104,672**	**14,413**

Table 5-14
Summary of Housatonic River Floodplain Soil PCB Mass Estimate

Total Area (acre)	Depth (inch)	Number of Detected Samples[1]	Bulk Density[2] (g/cm^3)		Depth Weighted PCB[3] (mg/kg)		Percent Detected	Area[4] (acre)	PCB Mass[5] (lbs)	
			+2 Std Error	-2 Std Error	+2 Std Error	-2 Std Error			+2 Std Error	-2 Std Error
Reach 6 - Woods Pond										
					Proximal Floodplain[6]					
22	0-6	58	1.1	0.93	29	14	82	18	816	311
	6-12	7	1.1	0.93	68	0	70	15	1,652	0
	12-18	9	1.1	0.93	59	0	75	16	1,537	10
	24-30	8	1.1	0.93	8.4	0	62	14	178	0
	Total								**4,183**	**321**
					Distal Floodplain[7]					
5	0-6	14	1.1	0.93	97	6.2	70	3	530	27
	6-12	2	1.1	0.93	25	0	29	1	57	0
	12-18	3	1.1	0.93	14	0	43	2	45	0
	18-24	1	1.1	0.93	0.59	0.59	17	1	1	1
	Total								**634**	**28**
							Reach Total		**4,817**	**349**
Reach 7 - Woods Pond Dam to Rising Pond										
					Proximal Floodplain[6]					
239	0-6	331	1.5	1.4	3.6	2.7	84	201	1,486	1,031
	6-12	165	1.5	1.4	4.1	2.7	76	182	1,503	948
	12-18	98	1.5	1.4	5.2	3.1	66	158	1,684	950
	18-24	25	1.5	1.4	9.0	2.8	78	187	3,398	1,014
	24-30	68	1.5	1.4	4.7	2.1	54	130	1,238	529
	30-36	16	1.5	1.4	3.6	0.014	80	191	1,401	5
	36-42	11	1.5	1.4	13	0	50	119	3,047	0
	42-48	5	1.5	1.4	3.4	0	45	109	748	0
	48-54	1	1.5	1.4	0.77	0.77	14	34	54	51
	54-60	1	1.5	1.4	3.0	3.0	50	119	717	682
	60-66	1	1.5	1.4	0.25	0.25	50	119	60	57
	Total								**15,336**	**5,267**
							Reach Total		**15,336**	**5,267**

Table 5-14
Summary of Housatonic River Floodplain Soil PCB Mass Estimate

Total Area (acre)	Depth (inch)	Number of Detected Samples[1]	Bulk Density[2] (g/cm^3)		Depth Weighted PCB[3] (mg/kg)		Percent Detected	Area[4] (acre)	PCB Mass[5] (lbs)	
			+2 Std Error	-2 Std Error	+2 Std Error	-2 Std Error			+2 Std Error	-2 Std Error
Reach 8 - Rising Pond										
					Proximal Floodplain[6]					
10	0-6	13	1.7	1.2	2.4	0.34	72	7	40	4
	6-12	11	1.7	1.2	1.7	0.25	58	6	22	2
	12-18	1	1.7	1.2	0.39	0.39	100	10	9	7
	18-24	1	1.7	1.2	0.39	0.39	100	10	9	7
	24-30	1	1.7	1.2	0.39	0.39	100	10	9	7
	Total								**88**	**26**
							Reach Total		**88**	**26**
Reach 9 - Rising Pond Dam to Connecticut Border										
					Proximal Floodplain[6]					
311	0-6	62	1.5	1.4	0.72	0.51	63	197	287	188
	6-12	58	1.5	1.4	1.1	0.59	57	179	390	198
	12-18	1	1.5	1.4	2.6	2.6	100	311	1,643	1,524
	18-24	1	1.5	1.4	0.77	0.77	100	311	487	451
	Total								**2,807**	**2,362**
							Reach Total		**2,807**	**2,362**

Proximal River Total	**322,386**	**56,082**
Distal River Total	**136,970**	**32,508**
River Total	**459,356**	**88,589**

Notes:

1. Number of samples with detectable concentrations of PCB.
2. The upper and lower bound for the bulk density was calculated from median percent solids for each reach using the following relationship:
   Bulk Density (g dry/cm3) = (Ds x Average Percent Solids +/- 2 Std Err) / (Ds–((Ds–Dw) * Average Percent Solids +/- 2 Std Err))
   where:
   Ds = density of solids (g/cm3) = 2.65 g/cm3, and
   Dw = density of water (g/cm3) = 1.00 g/cm3.
3. Two standard errors of the arithmetic mean of detected PCB concentrations.
4. Area prorated by percentage of detections (i.e., Total Area*% detected).
5. The upper bound PCB mass estimate is determined as the product of the arithmetic mean of detected PCB plus 2 standard errors, the reach-wide arithmetic mean bulk density plus 2 standard errors, and the "PCB-containing volume." Conversely, the lower bound PCB mass estimate is determined as the product of the arithmetic mean of detected PCB minus 2 standard errors, the reach-wide arithmetic mean bulk density minus 2 standard errors, and the "PCB-containing volume."
6. Proximal floodplain area comprises the area along the reach riverbank extending into the floodplain 50 feet perpendicular to the channel.
7. Distal floodplain area defined as the floodplain area outside the proximal area extending to the 1 ppm isopleth.
8. Includes all GE and EPA data. Data were depth-weighted (as necessary) to provide representative and comparable values for 6-inch increments (e.g., 0-6, 6-12, etc.)

Section 5 Figures

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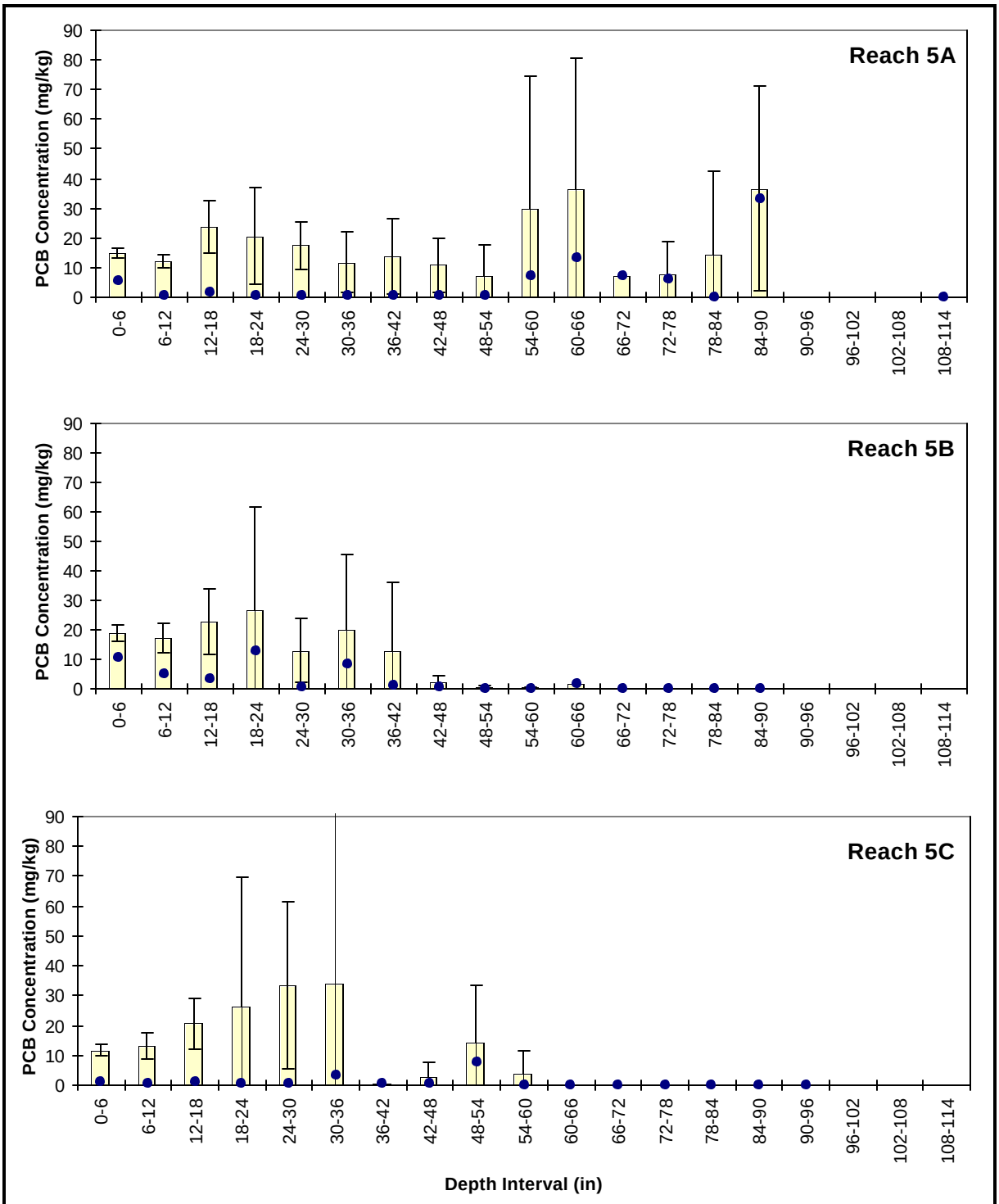

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Housatonic River - Rest of River
RFI Report

FLOODPLAIN AND RIVERBANK SOILS
PCB CONCENTRATION BY REACH AND DEPTH

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FIGURE
5-7a

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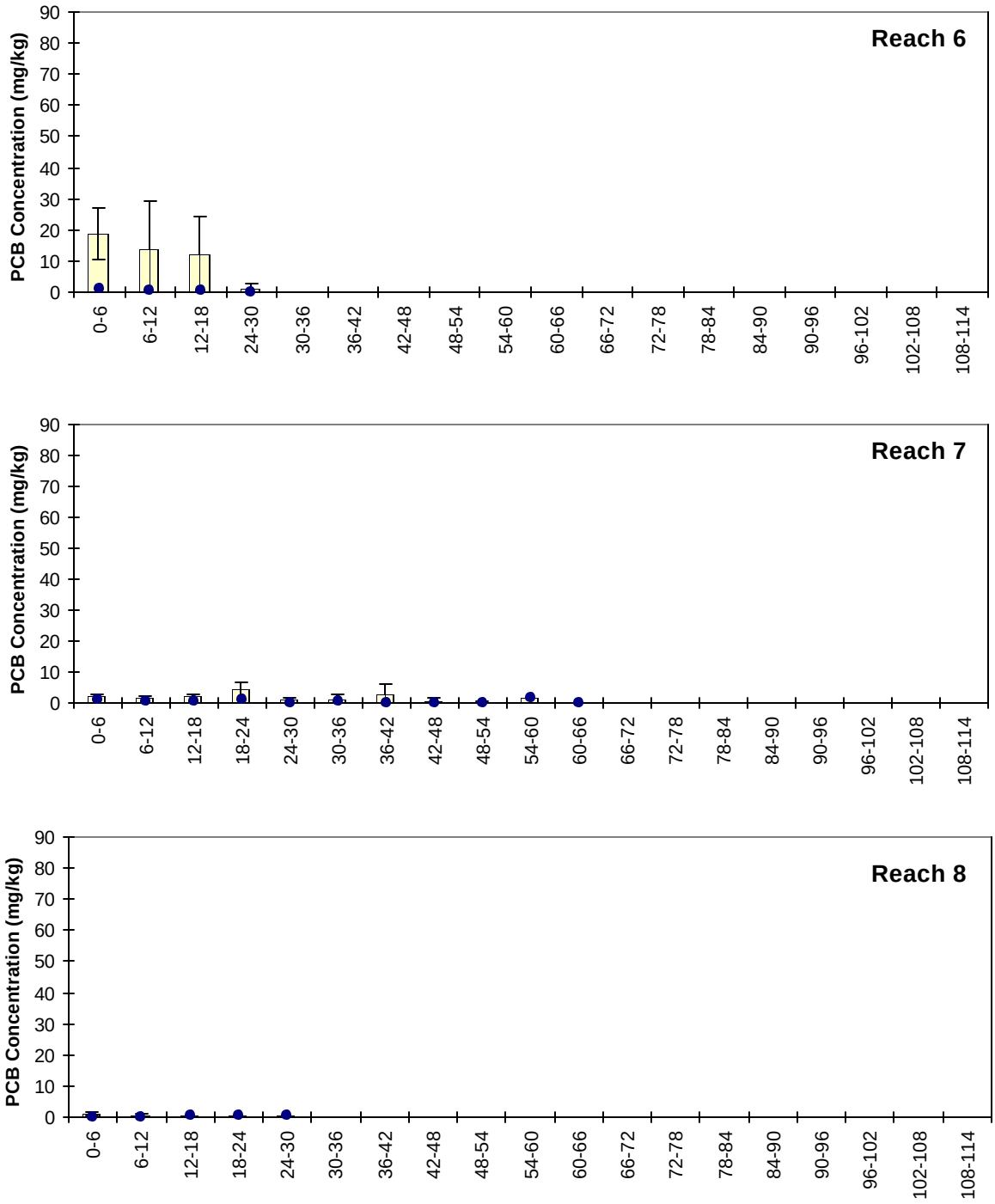

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FLOODPLAIN AND RIVERBANK SOILS
PCB CONCENTRATION BY REACH AND DEPTH

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FIGURE
5-7b

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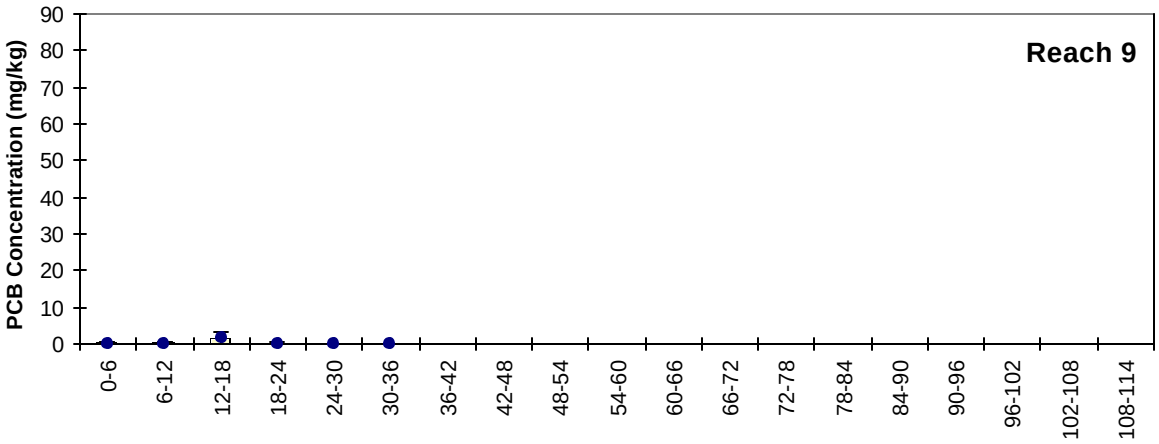

□ Arithmetic Mean

● Median

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FLOODPLAIN AND RIVERBANK SOILS
PCB CONCENTRATION BY REACH AND DEPTH

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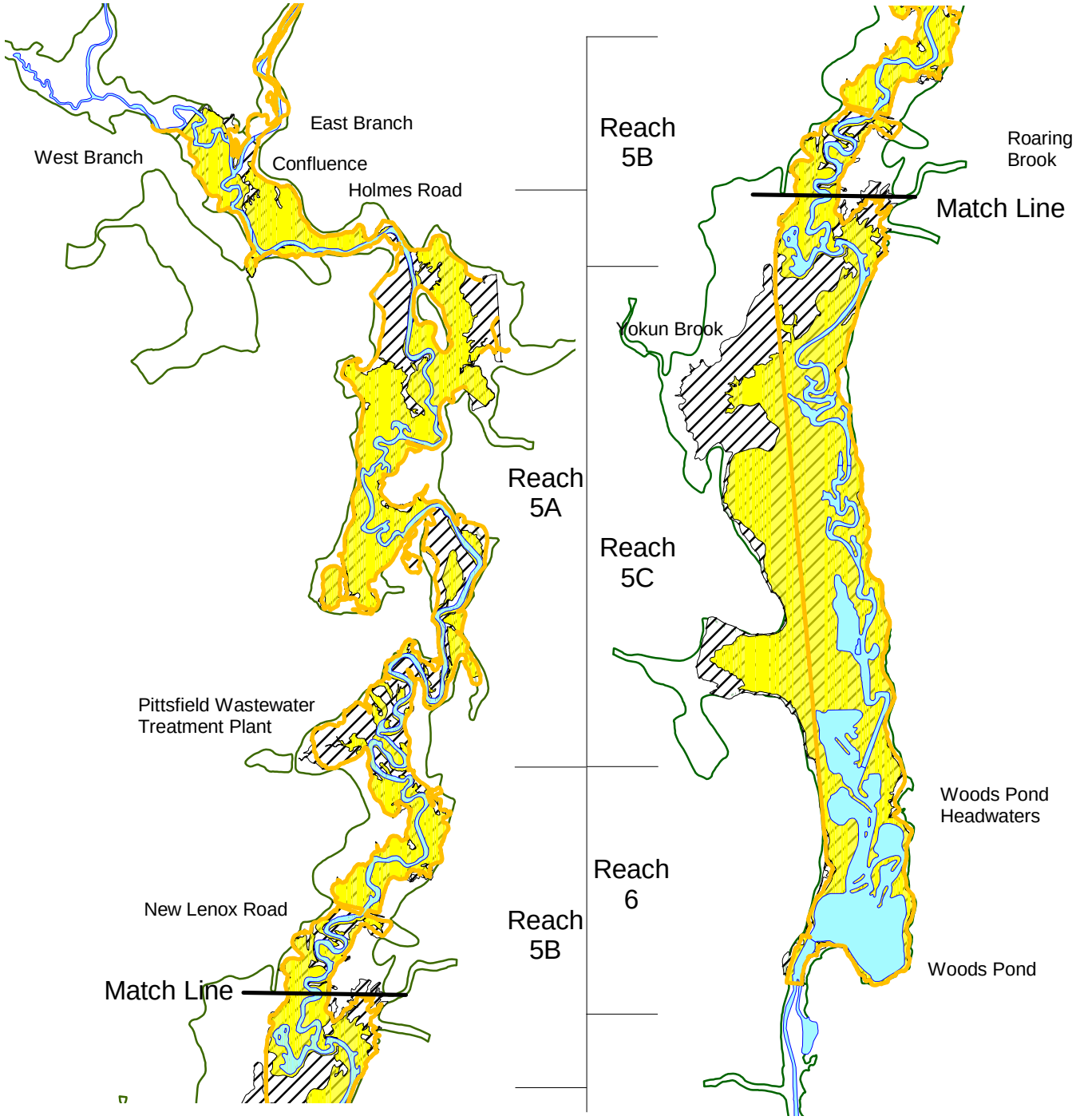
FIGURE
5-7c



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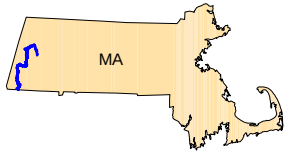
LOCATOR MAP



SCALE

0.25 0 0.25 0.5 Miles

LEGEND

- 1 mg/kg PCB Isopleth
- Housatonic River and Backwaters
- 2- Year Floodplain
- 10- Year Floodplain
- 100- Year Floodplain

Notes:

1. The 1mg/kg PCB isopleth is approximate, and was derived using hydraulic modeling performed by BBL (1995/1996), available topographic mapping, available floodplain soil PCB data, and best professional judgement.
2. 2- and 10-year floodplain extent determined from elevations calculated from HEC-2 flood stage modeling.
3. 100-year floodplain coverage provided by FEMA (Q3 Flood data).
4. Hydrology coverage provided by MassGIS.com.

FIGURE 5-9

HOUSATONIC RIVER 2-, 10-, AND100 -YEAR FLOODPLAINS

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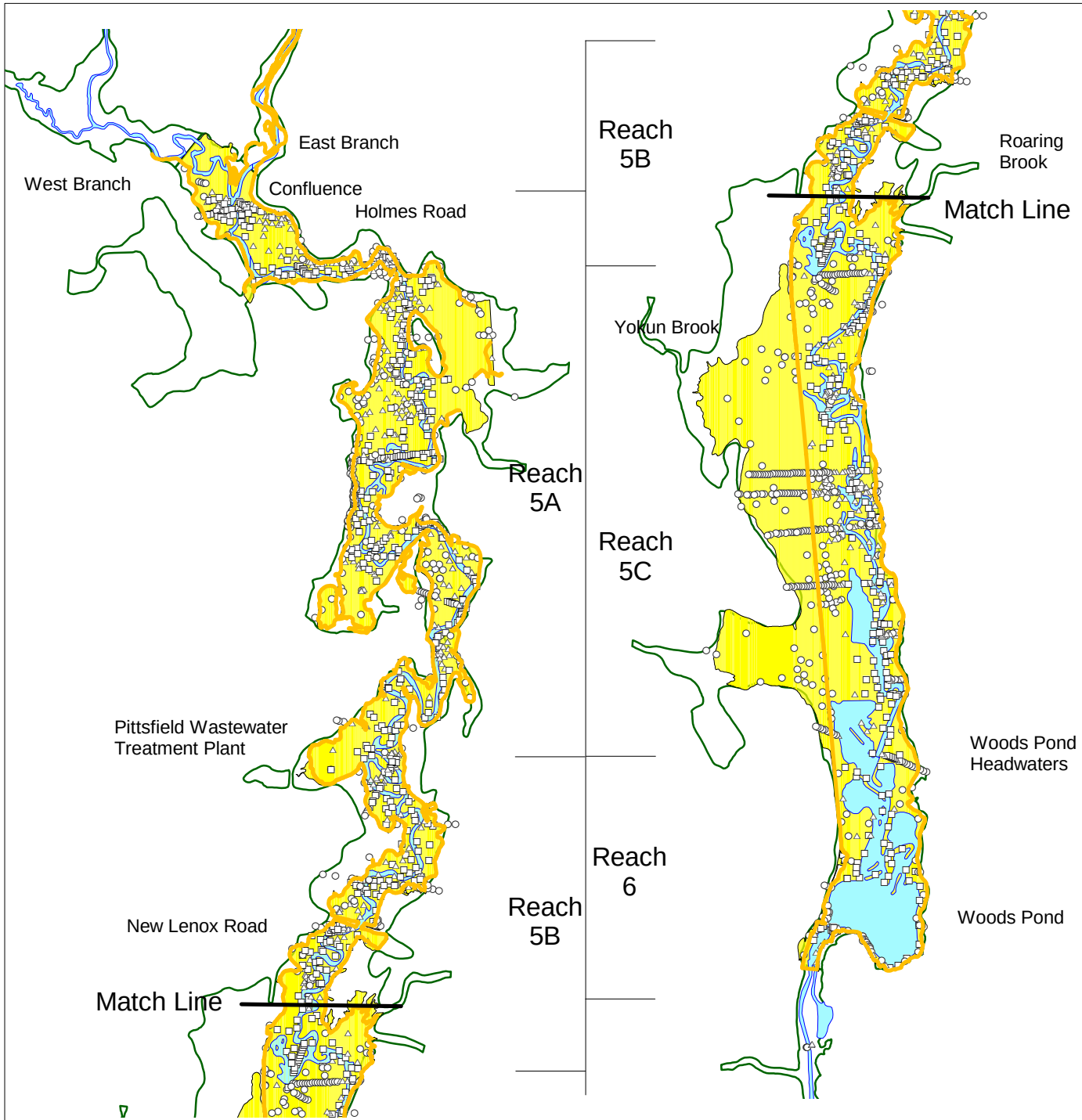

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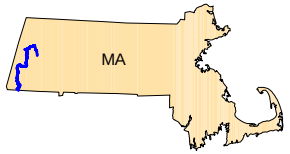
LOCATOR MAP



SCALE

0.25 0 0.25 0.5 Miles

LEGEND

Surface PCB Concentrations
- ○ < 1.0 ppm
- △ 1.0 - 10 ppm
- □ > 10 ppm

1 mg/kg Isopleth
Housatonic River and Backwaters
10-Year Floodplain
100-Year Floodplain

Notes:

1. The 1mg/kg PCB isopleth is approximate, and was derived using hydraulic modeling performed by BBL (1995/1996), available topographic mapping, available floodplain soil PCB data, and best professional judgement.
2. 10-year floodplain extent determined from elevations calculated from HEC-2 flood stage modeling.
3. 100-year floodplain coverage provided by FEMA (Q3 Flood data).
4. Hydrology coverage provided by MassGIS.com.

FIGURE 5-11

SURFACE SOIL (0-6 inches) PCB CONCENTRATIONS WITH 1 mg/kg ISOPLETH AND 10- AND 100-YEAR FLOODPLAINS

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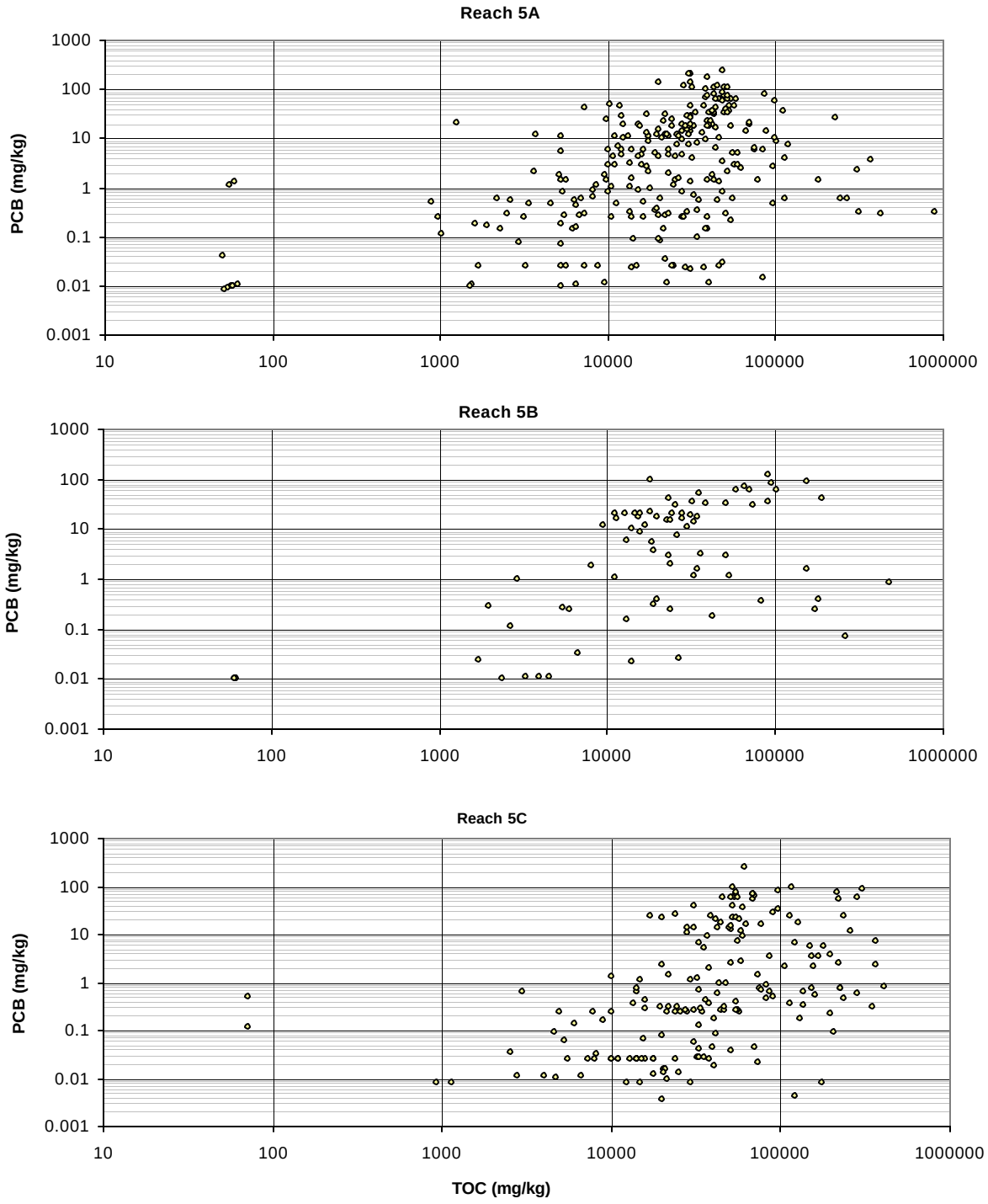

Notes:
1. PCB = polychlorinated biphenyls.
2. mg/kg = milligrams per kilogram.
3. Includes all GE and EPA data.

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RELATIONSHIP OF PCB CONCENTRATION AND TOTAL ORGANIC CARBON IN HOUSATONIC RIVER FLOODPLAIN AND RIVERBANK SOIL

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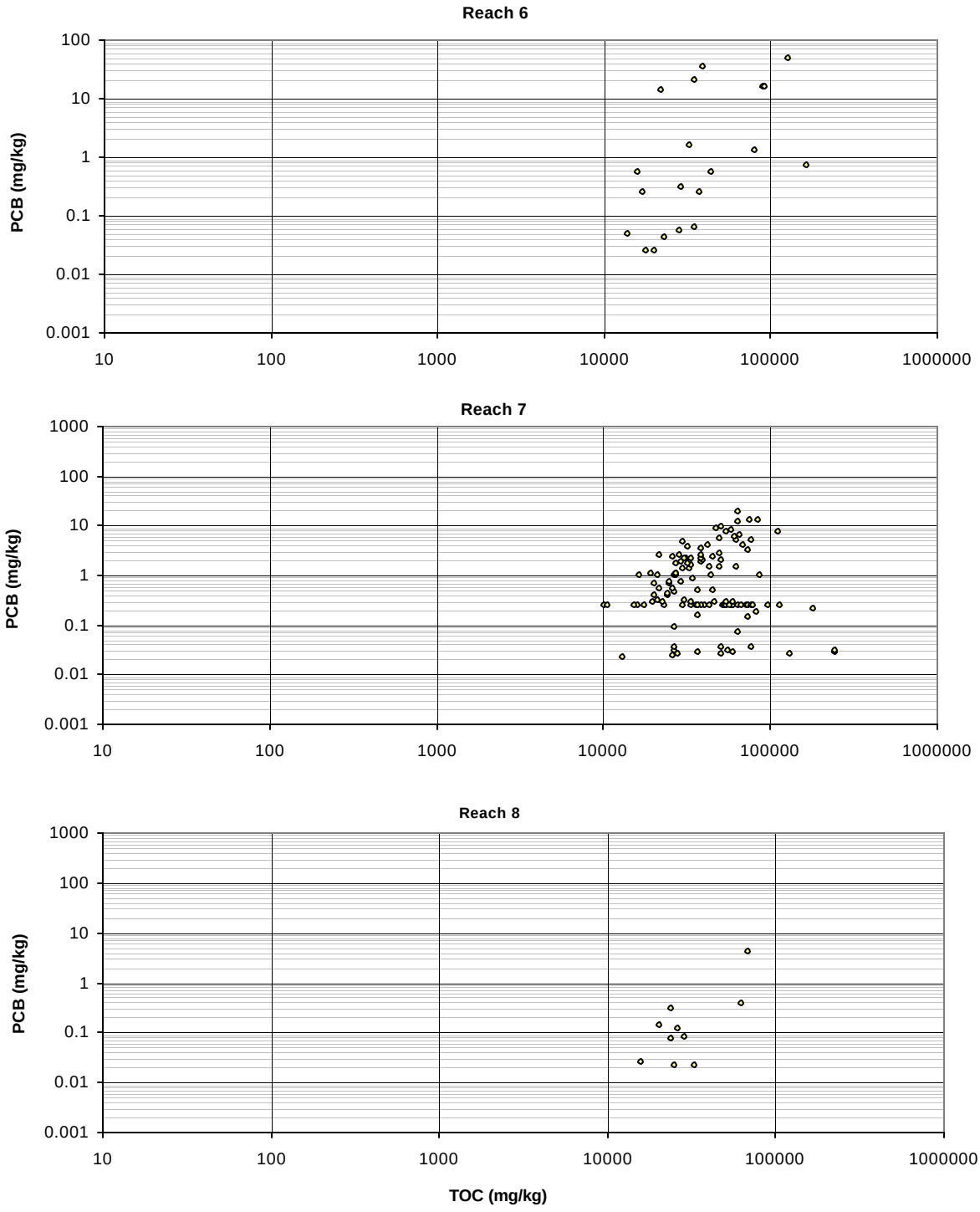
FIGURE 5-12a



Notes:
1. PCB = polychlorinated biphenyls.
2. mg/kg = milligrams per kilogram.
3. Includes all GE and EPA data.

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RELATIONSHIP OF PCB CONCENTRATION AND TOTAL ORGANIC CARBON IN HOUSATONIC RIVER FLOODPLAIN AND RIVERBANK SOIL

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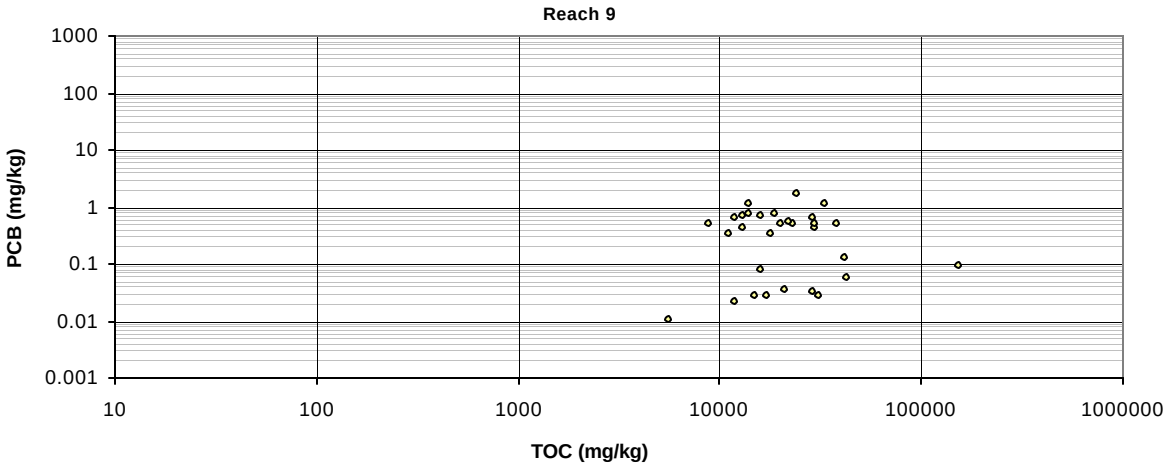
FIGURE
5-12b



Notes:
1. PCB = polychlorinated biphenyls.
2. mg/kg = milligrams per kilogram.
3. Includes all GE and EPA data.

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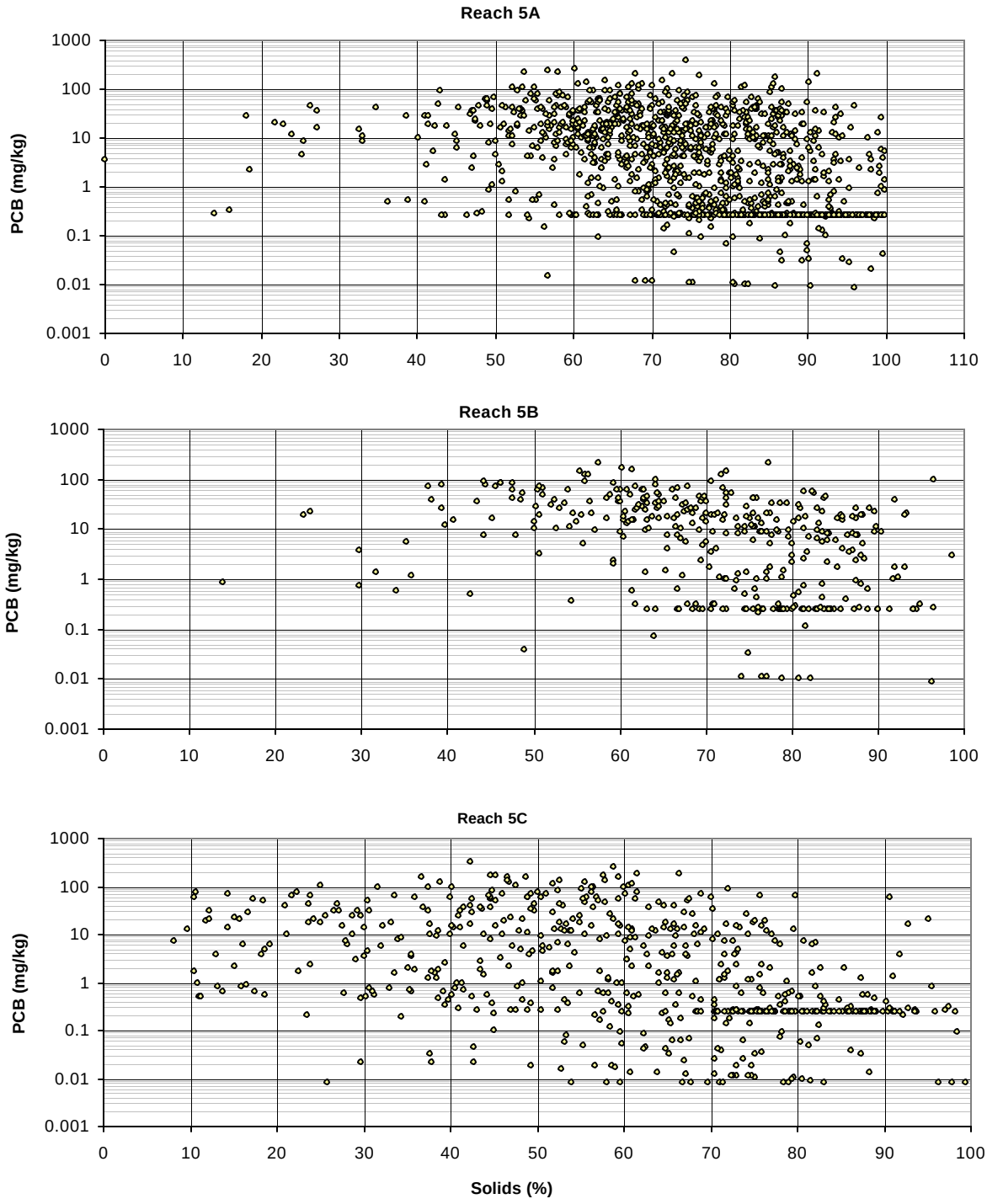
FIGURE
5-12c



Notes:
1. PCB = polychlorinated biphenyls.
2. mg/kg = milligrams per kilogram.
3. Includes all GE and EPA data.

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RELATIONSHIP OF PCB CONCENTRATION AND PERCENT SOLIDS IN HOUSATONIC RIVER FLOODPLAIN AND RIVERBANK SOIL

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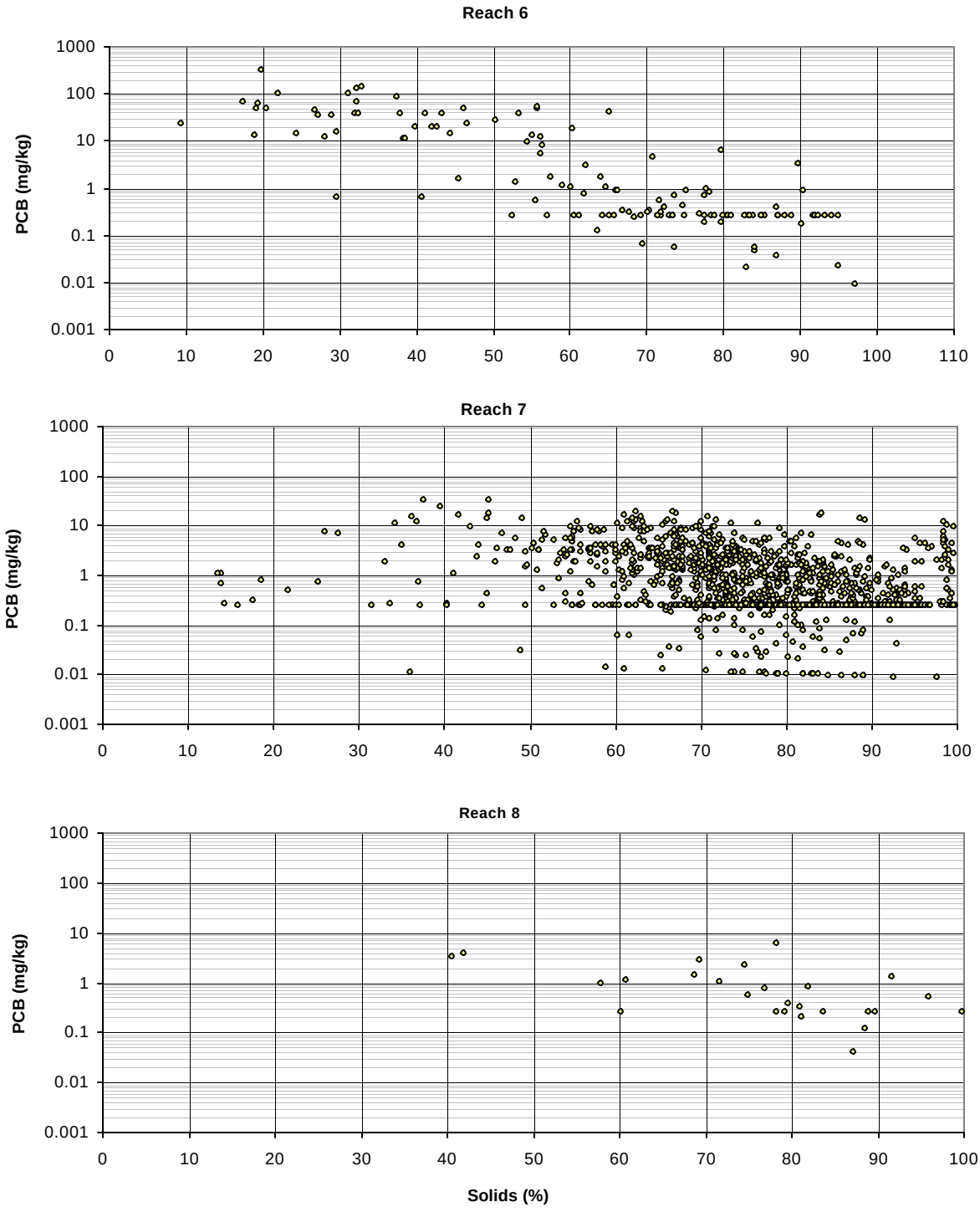
FIGURE
5-13a



Notes:
1. PCB = polychlorinated biphenyls.
2. mg/kg = milligrams per kilogram.
3. Includes all GE and EPA data.

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RELATIONSHIP OF PCB CONCENTRATION AND PERCENT SOLIDS IN HOUSATONIC RIVER FLOODPLAIN AND RIVERBANK SOIL

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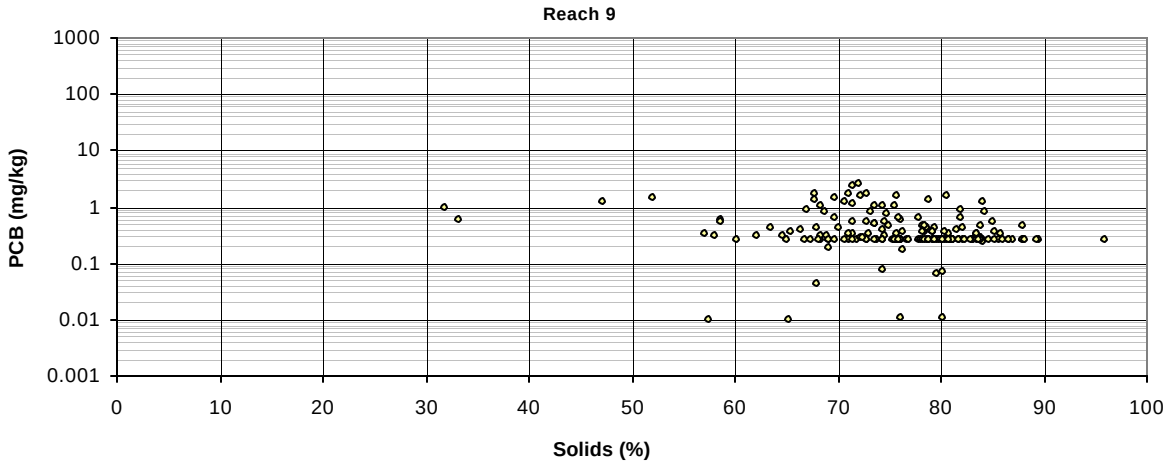
FIGURE
5-13b



Notes:
1. PCB = polychlorinated biphenyls.
2. mg/kg = milligrams per kilogram.
3. Includes all GE and EPA data.

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RELATIONSHIP OF PCB CONCENTRATION AND PERCENT SOLIDS IN HOUSATONIC RIVER FLOODPLAIN AND RIVERBANK SOIL

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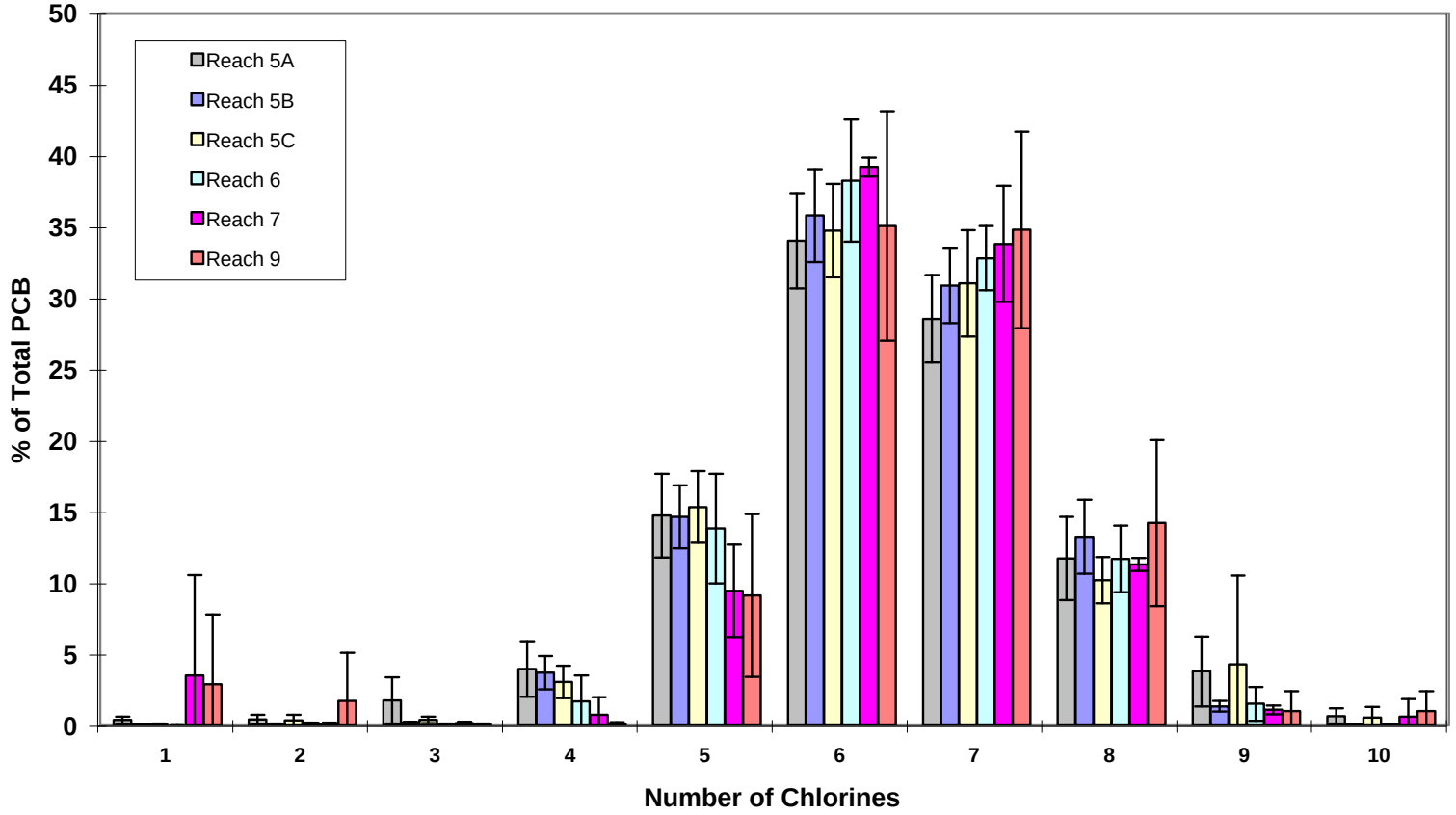
FIGURE 5-13c



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FLOODPLAIN AND RIVERBANK SOILS
AVERAGE PCB HOMOLOG DISTRIBUTION BY REACH

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FIGURE
5-14

Note:
Presents arithmetic mean +/- 2 standard errors.

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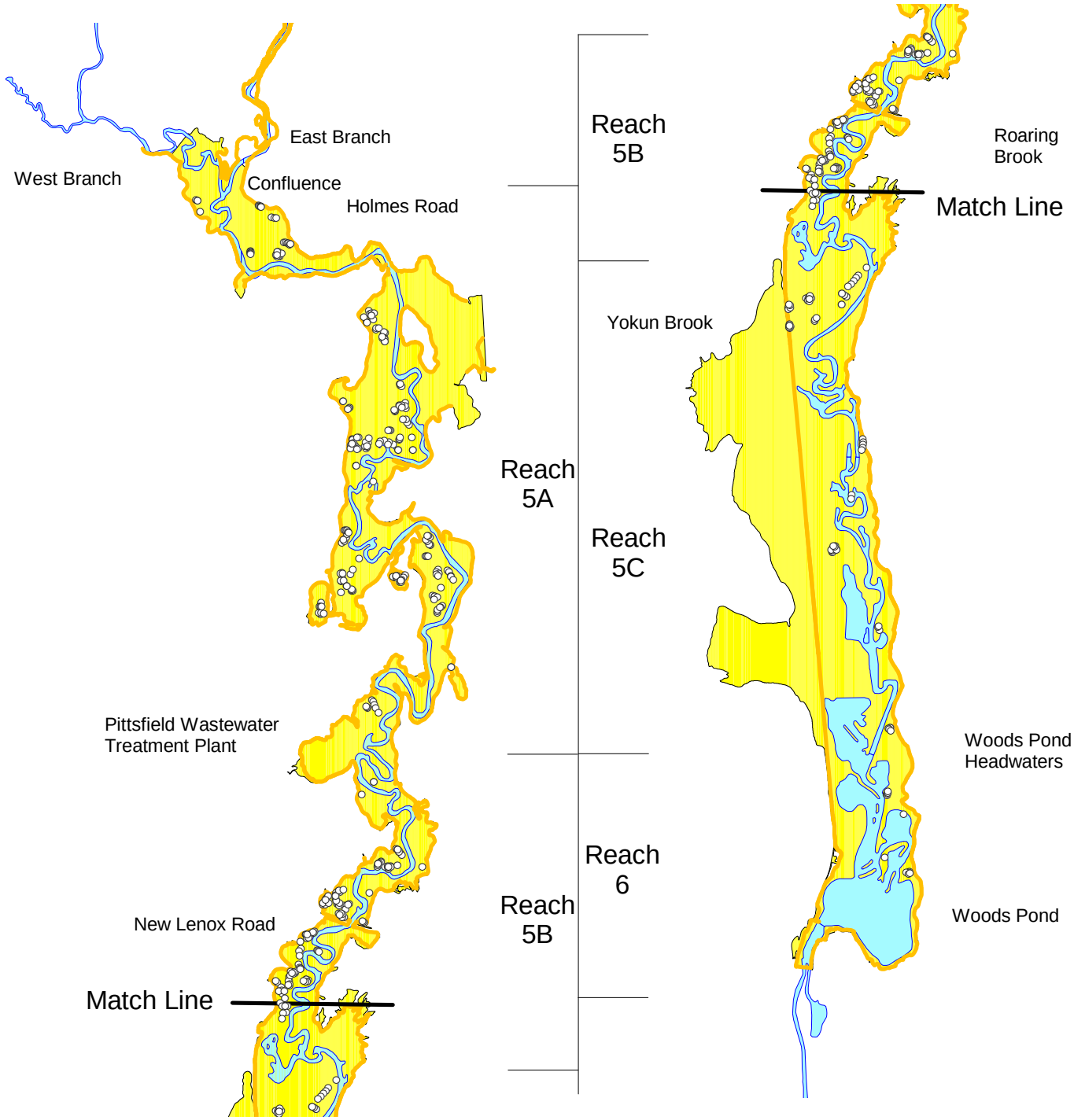

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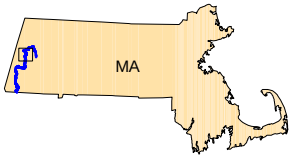
LOCATOR MAP



SCALE

0.25 0 0.25 0.5 Miles

LEGEND

Vernal Pool Sample Locations
Vernal Pool
1 mg/kg Isopleth
Housatonic River and Backwaters
10- Year Floodplain

Notes:

1. The 1mg/kg PCB isopleth is approximate, and was derived using hydraulic modeling performed by BBL (1995/1996), available topographic mapping, available floodplain soil PCB data, and best professional judgement.
2. 10-year floodplain extent determined from elevations calculated from HEC-2 flood stage modeling.
3. Samples are from a query of the vernal pool (VP) location type only.
4. Hydrology coverage provided by MassGIS.com.

FIGURE 5-15

VERNAL POOL SAMPLE LOCATIONS WITH 1 mg/kg ISOPLETH AND 10-YEAR FLOODPLAIN

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